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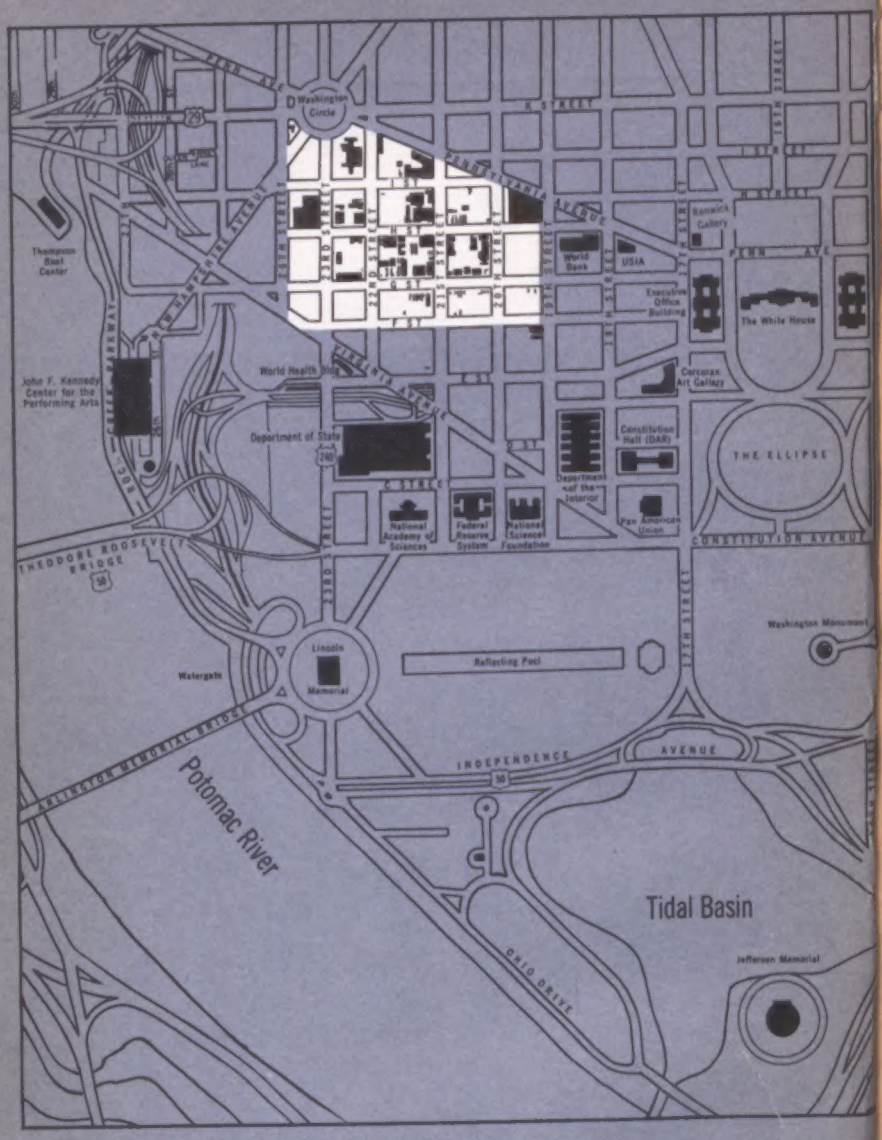
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HE GEORGE WASHINGTON UNIVERSITY BULLETIN

ume LXXVII, Number 3, May 1978

DERGRADUATE AND GRADUATE PROGRAMS

8-1979



THE GEORGE WASHINGTON UNIVERSITY CAMPUS/WASHINGTON, D. C.

THE GEORGE WASHINGTON UNIVERSITY BULLETIN

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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

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UNDERGRADUATE AND GRADUATE PROGRAMS 1978-1979

ARTS AND SCIENCES, EDUCATION AND HUMAN DEVELOPMENT, GOVERNMENT AND BUSINESS ADMINISTRATION, PUBLIC AND INTERNATIONAL AFFAIRS

This *Bulletin* lists the programs and faculties of Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Education and Human Development, the School of Government and Business Administration, the School of Public and International Affairs, and the Division of University Students.

For information concerning the School of Engineering and Applied Science, the National Law Center, the School of Medicine and Health Sciences, the College of General Studies, or the Summer Sessions, please request the appropriate bulletin.

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UNIVERSITIES are undergoing change, either drastically or slowly, as they have been for centuries. Whatever the changes, the one premise on which universities are based remains constant: universities are for learning—for acquiring learning, for transmitting learning, and for the exploration that yields new learning. Any other objective is unworthy of a university, and any other purpose is incompatible with the best interests of students and their relationship to the institution.

The faculty, through scholarship and research, extends learning, and it transmits learning by teaching. Students learn from the faculty, the library, and the laboratory—if they accept, as they must, learning as their objective. This learning does not take place in a vacuum; in addition to the particular content of learning, students will develop certain habits of mind—analytical thinking, powers of insight, self-examination, and the use of rational discourse—that will serve them throughout their personal and professional lives.

Within this basic context, George Washington University invites students to take up their residence in order that their energies, interests, and talents may be directed to learning.

Exceptional opportunities for learning are made possible because of the University's location in the heart of the nation's capital. For example, cooperative programs are conducted in various fields of study with members of Congress, the Smithsonian Institution, the Library of Congress, the National Gallery of Art, and other federal and private organizations. In addition to these programs, Washington presents opportunities for observation, study, service, and recreation limited only by students' time, energy, and imagination.

In this atmosphere, George Washington University seeks to provide a matrix for learning not available in the standard university education, so that graduates can never forget that as students they were at the center of government and that they must forever carry additional responsibility in and for society, because of the opportunity that was theirs.

The George Washington University
LLOYD H. ELLIOTT
President

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1978

AUGUST

S	M	T	W	T	F	S
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1979

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JULY

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1978 FALL SEMESTER

August 28	Orientation begins for students from foreign countries and for freshmen who did not attend Summer Advance Registration Program
August 29	Placement tests and advising for entering freshmen who did not attend Summer Advance Registration Program
	Orientation begins for transfer students
August 30	Placement tests and advising for transfer students
	Advising for sophomores, juniors, and seniors in the School of Government and Business Administration
† *August 31-September 2*	Registration; application for February graduation due as part of registration
September 4	Labor Day (holiday)
September 5	On-campus classes begin

* This calendar is subject to change.
† The registration procedure and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester

September 6	University Faculty Assembly meeting
September 8	Faculty Senate meeting
September 14	Off-campus classes begin
September 15	Applications due for October Ed.D. Comprehensive Examinations
October 12	Applications due for November Master's Comprehensive Examinations in the School of Public and International Affairs and in the School of Government and Business Administration
October 13	Faculty Senate meeting
October 14	Ed.D. Comprehensive Examinations
October 19	Board of Trustees meeting
November 1	Applications due for spring semester financial aid
November 10	Applications due for Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations
	Faculty Senate meeting
November 10-11	School of Public and International Affairs and School of Government and Business Administration Master's Comprehensive Examinations
November 20	D.B.A., D.P.A., and Ph.D. dissertations due from February candidates
November 22	Thanksgiving holiday begins after last class
November 27	Classes resume
December 5	Last day of fall semester on-campus classes
December 8	Faculty Senate meeting
December 9	Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations
December 11-20	Examination period
December 22	Last day of fall semester off-campus classes

1979 SPRING SEMESTER

January 2	Master's theses and Ed.D. dissertations due from February candidates
January 8	Orientation for students from foreign countries
January 9-10	Orientation for new students; advising for all students
January 10	All degree requirements to be completed and reported to the Graduate School of Arts and Sciences for February graduation
* *January 11-13*	Registration; application for May graduation due as part of registration
January 12	Applications due for February Ed.D. Comprehensive Examinations
January 15	Spring semester on-campus and off-campus classes begin
January 18	Board of Trustees meeting
January 19	Faculty Senate meeting
January 23	University Faculty Assembly meeting
February 1	Deadline for submission of 1979-80 freshmen student financial aid applications

* The registration procedure and the hours of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

February 9	Faculty Senate meeting
February 19	Winter Convocation (holiday)
February 24	Ed.D. Comprehensive Examinations
March 1	Deadline for submission of 1979-80 undergraduate continuing and transfer student financial aid applications
	Ph.D. dissertations due from May candidates
March 7	Applications due for April Master's Comprehensive Examinations in the School of Public and International Affairs and the School of Government and Business Administration
March 9	Faculty Senate meeting
March 10	Spring recess begins after last class
March 15	Board of Trustees meeting
March 16	Applications due for Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations
March 19	Classes resume
	Ed.D. dissertations due from May candidates
March 26	D.B.A. and D.P.A. dissertations due from May candidates
April 1	Deadline for submission of Summer Sessions and 1979-80 graduate financial aid applications
April 13	Faculty Senate meeting
April 13-14	School of Government and Business Administration and School of Public and International Affairs Master's Comprehensive Examinations
April 16	Master's theses due from all May candidates except those in the School of Public and International Affairs
April 19	All degree requirements to be completed and reported to the Graduate School of Arts and Sciences for May graduation
April 20	Master's theses due from May candidates in the School of Public and International Affairs
	Last day of spring semester on-campus classes
April 21	Ed.D., Ed.S., and M.A. in Ed. Comprehensive Examinations
April 26-May 5	Examination period
April 30	Last day of spring semester off-campus classes
May 1	Last day for current master's degree candidates in the Graduate School of Arts and Sciences to apply for Ph.D. programs
May 4	Faculty Senate meeting
May 6	Commencement
May 17	Board of Trustees meeting

FACTS ABOUT GEORGE WASHINGTON UNIVERSIT

General Information	Private, nonsectarian, coeducational founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of On-campus Students	8,273 full-time; 8,094 part-time (equivalent to 11,544 full-time students altogether)
Geographical Origin of Students	50 states, District of Columbia, 120 countries
1978-79 Tuition	Undergraduate: $3,000 for two semesters; graduate: $110 for each semester hour (see page 29)
Number of Full-time Faculty	1,000 (81% with doctoral degrees)
Number of Part-time Faculty	455 (includes some of the most distinguished men and women in Washington)
Residence Hall Space	2,184
Room and Board	Cost varies from approximately $1,80 to $2,150 for the academic year (see pages 60-61)

Undergraduate majors: Accounting, American Civilization, American Literature Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology Botany, Business Administration, Cartography, Chemistry, Chinese Languag and Literature, Civil Engineering, Classical Archeology and Anthropology Classical Archeology and Classics, Classical Humanities, Computer Science Dramatic Art, East Asian Studies (China and Japan), Economics, Electrica Engineering, Elementary Education, English Literature, Environmental Studies Fine Arts, French Language and Literature, Geodesy, Geography, Geology Germanic Languages and Literatures, History, Human Kinetics and Leisur Studies, International Affairs, Journalism, Judaic Studies, Latin America Studies, Law Enforcement, Mathematical Statistics, Mathematics, Mechanica Engineering, Medical Technology, Middle School Education, Music (Applied History and Literature, Theory), Nursing Anesthesia, Nurse Practitioner Program, Oceanography, Philosophy, Physician's Assistant Program, Physics Political Science, Premedicine, Psychology, Public Affairs, Radiologic Science and Administration, Religion, Russian Language and Literature, Russian Litera ture and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communicatio and Broadcasting, Speech Pathology and Audiology, Urban Affairs, Zoology

Study leading to graduate or professional degrees is offered in the Graduat School of Arts and Sciences, the National Law Center, the School of Medicin and Health Sciences, the School of Engineering and Applied Science, the Schoo of Education and Human Development, the School of Government and Busines Administration and the School of Public and International Affairs.





THE UNIVERSITY

HISTORY

The George Washington University had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a national university in the federal city. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company, "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended a "fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue to somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period, the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half-century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area has many reminders of historic interest to

the University. President Monroe, who signed the Charter, lived at 2017 Ey Street. The first President of the Board of Trustees, the Reverend Obadia B. Brown, was for fifty years the pastor of a church at Nineteenth and Ey Streets, and Washington selected Twenty-third and E Streets as the sit of the National University he hoped to see established.

PURPOSE AND OBJECTIVES

The purpose of The George Washington University was to realize "th aspirations of Washington, Jefferson and Madison, for the erection of university at the seat of the Federal Government." Over the years it ha been the aim to develop the University ideal in the nation's capital with view toward meeting the changing needs of society while continuing pursue the traditional principles of learning and research.

The George Washington University now rededicates itself and all th resources at its command to the pursuit of knowledge and its dissemin tion.

To this end:

The University recognizes its special opportunities in and obligations one of the principal capitals of the world. It is a primary objective of th University to utilize its historical, geographical, and functional relatio ship to the nation's capital and the Washington community in continuin the development of a great nationally and internationally oriented un versity.

The University recognizes the needs of our times and accepts the cha lenge to develop each student's potential abilities to the fullest exte

The University is and should remain privately controlled, nonsectari and coeducational.

Admission to the University is determined only in terms of the pe sonal character and academic qualifications of the candidates.

A broadly based liberal education is fundamental to the total progra of the University.

Expansion of graduate and professional studies and research and t utilization for this purpose of the excellent research facilities and mat rials available in the nation's capital are basic to the continuous d velopment of the University's educational program.

The provision of superior instruction and facilities and the applicati of high standards of entrance qualifications and academic achievement all students whether full-time or part-time, on-campus or off-campus, a major missions of the University.

A balanced program of student extracurricular activities is an integr part of the University program.

The University will continue to strive to meet the evident needs of enlarged student body while governing the size of enrollment by capacity to supply adequate staff and facilities for the excellent teachi and research which it espouses.

THE COLLEGES, SCHOOLS, AND DIVISIONS

George Washington University includes 12 colleges, schools and divisions, as follows:

*Columbian College of Arts and Sciences** offers four-year programs in the arts and sciences leading to the degrees of Bachelor of Arts and Bachelor of Science. The College also provides prelegal and premedical programs, and the preprofessional work required for admission to the School of Public and International Affairs. Columbian College has academic jurisdiction over the off-campus programs leading to the degrees of Associate in Arts in General Studies, Bachelor of General Studies, Bachelor of Science in Geodesy, Bachelor of Science in Cartographic Science, and Bachelor of Science in Oceanography. These off-campus programs are administered by the College of General Studies.

The Graduate School of Arts and Sciences†‡ offers advanced study and research leading to the degrees of Master of Arts, Masters of Arts in Special Studies, Master of Fine Arts, Master of Forensic Sciences, Master of Music, Master of Science, Master of Science in Forensic Science, Master of Science in Special Studies, Master of Science for Teachers, and Doctor of Philosophy. The degrees of Master of Arts in Special Studies and Master of Science in Special Studies are also available through off-campus programs administered by the College of General Studies.

The School of Medicine and Health Sciences†* offers work leading to the degrees of Associate in Science, Bachelor of Science, and Doctor of Medicine.

The National Law Center‡ offers courses leading to the degrees of Juris Doctor, Master of Laws, Master of Comparative Law, Master of Comparative Law (American Practice), and Doctor of Juridical Science; and special programs in Continuing Legal Education.

The School of Engineering and Applied Science offers courses leading to the degree of Bachelor of Science in the following areas: civil engineering, electrical engineering, and mechanical engineering. Graduate programs lead to the degrees of Master of Science, Master of Engineering Administration, Engineer, Applied Scientist, and Doctor of Science. The School has academic jurisdiction over the off-campus programs leading to the degrees of Master of Science, Master of Engineering Administration, and Doctor of Science. These off-campus programs are administered by the College of General Studies.

The School of Education and Human Development offers undergraduate programs leading to the degrees of Bachelor of Arts in Education and

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* Columbian College of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Bachelor of Arts and Doctor of Medicine.

† The Graduate School of Arts and Sciences cooperates with the School of Medicine and Health Sciences in offering a program leading to the combined degrees of Master of Science and Doctor of Medicine and a dual program leading to the degrees of Doctor of Medicine and Doctor of Philosophy.

‡ The National Law Center cooperates with the School of Public and International Affairs, the Graduate School of Arts and Sciences and the School of Government and Business Administration in offering a program leading to the combined degrees of Juris Doctor and Master of Arts.

Bachelor of Science in Human Kinetics and Leisure Studies; graduate studies leading to the degrees of Master of Arts in Education, Master of Arts in Teaching, Education Specialist, and Doctor of Education. The degree of Master of Arts in Education is also available through off-campus programs administered by the College of General Studies.

*The School of Government and Business Administration** offers undergraduate programs leading to the degrees of Bachelor of Business Administration and Bachelor of Science in Health Care Administration; graduate programs leading to the degrees of Master of Arts in Government, Master of Arts in Health Care Administration, Master of Business Administration, Master of Public Administration, Master of Urban and Regional Planning; the Post-master's Graduate Certificate in Health Care Administration; the degrees of Doctor of Business Administration and Doctor of Public Administration. The School also has academic jurisdiction over off-campus programs leading to the degrees of Bachelor of Science in Administration and Master of Science in Administration. These off-campus programs are administered by the College of General Studies.

*The School of Public and International Affairs** offers undergraduate programs leading to the degree of Bachelor of Arts and graduate programs leading to the degree of Master of Arts. The School also offers an off-campus program leading to the degree of Master of Science in International Affairs.

The College of General Studies supplements the adult education program of the University through campus and off-campus study; conferences, seminars, and special projects; and continuing education and non-credit programs. This College also administers the off-campus programs over which Columbian College of Arts and Sciences, the Graduate School of Arts and Sciences, the School of Engineering and Applied Science, the School of Education, and the School of Government and Business Administration have academic jurisdiction.

The Division of University Students makes available courses for students not candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

The National Law Center is a charter member of the Association of American Law Schools and is approved by the Section of Legal Education and Admissions to the Bar of the American Bar Association. The School of Medicine and Health Sciences is a member of the Association of American Medical Colleges and is one of the medical colleges which

* The National Law Center cooperates with the School of Public and International Affairs, the Graduate School of Arts and Sciences, and the School of Government and Business Administration in offering a program leading to the combined degrees of Juris Doctor and Master of Arts

have been continuously approved by the American Medical Association. Undergraduate curricula of the School of Engineering and Applied Science in civil, electrical, and mechanical engineering are accredited by the Engineers' Council for Professional Development. The School of Education and Human Development is a charter member of the American Association of Colleges for Teacher Education and is accredited by the National Council for Accreditation of Teacher Education for its bachelor's and master's degree programs. The School of Government and Business Administration has maintained full membership in the Middle Atlantic Association of Colleges of Business Administration since 1961. It joined the Council on Graduate Education for Public Administration in 1966. In 1968, the School became a member of the American Assembly of Collegiate Schools of Business and, in 1977, its undergraduate program was accredited by the Assembly. The programs in accounting satisfy the educational requirements for the Certified Public Accountant and the Certified Management Accountant professional examinations. The program in hospital administration is accredited by the National Accrediting Commission on Graduate Education for Hospital Administration. The Master of Urban and Regional Planning degree program is recognized by the American Institute of Planners. The Department of Chemistry is on the approved list of the American Chemical Society. The graduate program in clinical psychology in the Department of Psychology is on the approved list of the American Psychological Association. The program in speech pathology and audiology is accredited by the Education and Training Board of the American Boards of Examiners in Speech Pathology and Audiology.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

George Washington University does not discriminate against any person on the basis of sex, race, color, religion, national origin, or handicap in any of its education or employment programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 and the Rehabilitation Act of 1973 call for an explicit statement that the requirement not to discriminate on the basis of sex or handicap extends to employment in and admission to such programs and activities.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to Marianne Phelps, Assistant Provost for Affirmative Action, Rice Hall, Washington, D.C. 20052, or to the Director of the Office for Civil Rights of the Department of Health, Education, and Welfare.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the Corcoran Gallery of Art, the Department of State, the National Academy of Sciences, the John F. Kennedy Center for the Performing Arts, and many other governmental and cultural institutions.

THE UNIVERSITY LIBRARIES

The library collections of the University are housed in the University Library (the general library of the University) and in the libraries of the Institute for Sino-Soviet Studies, the National Law Center, and the School of Medicine and Health Sciences.

These collections contain approximately 750,000 volumes, to which are added some 40,000 volumes a year. Endowments supplementing the University appropriation provide books in the fields of American civilization, American literature, foreign service, history, public finance, and the social sciences; and gifts from many sources have enriched the collections. The libraries currently receive about 7,800 periodicals.

Information concerning the use of the libraries may be obtained at the library service desks.

The library is administered for the curricular, reference, and recreational needs and interests of the students. Instruction in the use of the library is given upon request by the reference librarians. The library endeavors to assist students and all members of the University to use the rich library resources of Washington and the unusual opportunities they offer for extensive research. Interlibrary loan arrangements are maintained with other libraries in the city and thoughout the United States.

The student has access to the Library of Congress, the Public Library of the District of Columbia and its branches, and many of the special collections of the government departments. Graduate students at George Washington University may, upon application, be issued a Consortium library card which permits direct borrowing from the libraries of the other Consortium Institutions.

THE BOARD OF TRUSTEES OF THE UNIVERSITY

The University is privately endowed and is governed by a Board of Trustees of which the President of the University is an *ex officio* member.

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Theodore George Toridis
*Peter B. Vaill
Glenn Anthony Walker
†Reuben Esselstyn Wood
John Edmund Ziolkowski

O'Neal Smalls, *Parliamentarian*

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*Ex officio member
†Chairman of the Executive Committee

ADMISSION

The University accepts both men and women. Students are admitted a the beginning of each semester and summer session.

An application for admission to degree candidacy should be accom panied by a $10 (for undergraduate study) or $25 (for graduate study application fee.* The application fee is waived for graduates of this Un versity applying to the Graduate School of Arts and Sciences, and fo students applying for readmission who were registered as degree cand dates at the time of their last registration at this University and who hav not since registered at another institution.

Applicants are urged to submit the application form and complete cre dentials well in advance of the semester for which they seek admissio Specific dates are given in each section below.

The right is reserved to refuse admission to any student with an aca demic record which creates doubt of ability to succeed in college or who for any other reason, would not be an acceptable student. In the selectio process, there is no discrimination because of sex, race, color, religion, o national origin.

UNDERGRADUATE ADMISSION†

Forms for application for admission or readmission to undergraduate o nondegree status are available at and should be returned to the Office o Admissions, George Washington University, Washington, D.C. 20052.

Secondary School Students

Applicants who wish to begin college in the fall semester or in a summe session should apply during the fall term of the senior year in high schoo Preference will be given to students who submit applications and required credentials prior to March 1. Students graduating at mid-year who wis to begin college in the spring semester should apply no later than No vember 1.

Although decisions on most applications for the fall semester will re quire submission of seventh-term grades and senior-year test scores, a earlier decision will be given after September 1 to students whose applica tions become complete with secondary school records through the junio year and junior-year test scores, provided these records clearly establis admissibility.

Early Admission Plan—Unusually well-prepared students who hav completed the junior year in high school may be considered for admis

* Application fee must be by check or postal money order, payable to George Washington Uni versity.

† For detailed admission requirements, see the appropriate college or school in this *Bulletin* Tests required for admission are described on pages 75 and 137-38. See pages 25-27 for admission requirements for students from foreign institutions.

sion. This plan is designed for those students who, in terms of academic preparation and emotional maturity, are ready to enter college. More often than not, students interested in early admission have substantially exhausted the high school offerings in several academic areas. For such students, remaining in high school for the senior year would not be in their best interest, nor in the best interest of the school.

To be considered for early admission, students must:

1. meet most of the secondary school requirements for graduation and complete the University's required entrance units (see pages 68–69),
2. have the unqualified recommendation of the secondary school principal or counselor,
3. submit two letters of recommendation (in addition to the counselor's) from teachers who can testify to the student's maturity and general readiness to enter college,
4. submit SAT or ACT scores.

The student's chances for admission will be improved if scores of CEEB achievement tests or Advanced Placement Tests in subjects taken in the sophomore year are submitted.

Applicants from a secondary school must arrange to have sent directly from their schools to the Office of Admissions a complete academic record together with a personal evaluation and recommendation from the principal. This information should be supplied on a standard form used by the secondary school.

Transfer Students

Undergraduate transfer students from other institutions should submit application and required credentials prior to June 1 for the fall semester, November 1 for the spring semester, and April 1 for the summer sessions.

The transfer student must be in good standing as to scholarship and conduct. A student who has been academically dismissed or suspended more than one time normally will not be considered for admission.

An applicant who has attended one or more institutions of higher learning must request each registrar to mail directly to the Office of Admissions a transcript of his or her record, *even though credits were not earned.*

If high school units are not shown on the college transcript, the applicant must request that the high school record be sent to the Office of Admissions.

If an applicant has fewer than 30 semester hours of acceptable work (C or better in academic courses from an accredited institution) at the time the application is submitted, the applicant must request that his or her high school record and College Entrance Examination Board or ACT test scores be sent to the Office of Admissions.

Advanced Tuition Deposit

After notification of acceptance, a $100 advanced tuition deposit will be required of all full-time undergraduate students including those readmitted. This deposit is not due until May 1 for students entering in the fall semester or until December 15 for students entering in the spring semester. The deposit is credited toward tuition and is not refundable.

Advanced Standing and Advanced Placement

CREDIT FROM INSTITUTIONS OF HIGHER LEARNING

Where there is no duplication involved either through coursework examination, advanced standing may be granted for work successfu completed at accredited institutions of higher learning. It will be gran only when it meets the requirements for the degree sought at this U versity and may be accepted provisionally. Work of low-pass grade (D the equivalent) will not be considered for transfer.

Except for students transferring to the School of Government and Bu ness Administration from a two-year or junior college, in which case more than 60 semester hours of credit may be assigned, there is no st limit to the total amount of credit that may be assigned. However student must satisfy the residence and course requirements for the deg sought at George Washington University.

CREDIT BY EXAMINATION

Assuming there is no duplication of coursework earned, a maximum of semester hours of credit may be assigned upon admission to the Univers for each or any combination of the following except as noted:

COLLEGE ENTRANCE EXAMINATION BOARD ADVANCED PLACEMENT TESTS (APT)

Credit is assigned for examinations passed with scores of four or five the basis of a score report sent to the Office of Admissions from the Ed cational Testing Service at the student's request. Examinations passed w scores of three will be considered for credit or placement if the stude arranges to have the examination paper sent to the Office of Admissio The Advanced Placement Tests are administered in the seconda school in May of each year. Normally only students who complete course designated as Advanced Placement are prepared for the exami tion. Arrangements for the examination are the responsibility of the plicant and should be made through the secondary school attended with the Program Director, College Entrance Examination Board, A vanced Placement Tests, Box 592, Princeton, N.J. 08540, or Box 10 Berkeley, Calif. 94701.

COLLEGE ENTRANCE EXAMINATION BOARD COLLEGE-LEVEL EXAMINATION PROGRAM (CLEP)

CLEP offers two types of examinations: General and Subject Exami tions. CLEP General Examinations are offered in five areas: mathemati social sciences, humanities, natural sciences and English compositio CLEP Subject Examinations measure achievement of specific college-lev courses and are offered in more than 20 subjects.

Upon admission to degree candidacy, credit is assigned for the Gener Examinations, with the exception of the English composition examinatio To receive credit, examinations must be passed at the 50th percentile

above (college sophomore norms). Credit is assigned, with a few exceptions, for the Subject Examinations passed at the level recommended in the College Board model policy. A candidate for a degree from any school at this University must seek departmental approval *prior* to taking the examination to receive credit for a CLEP Subject Examination. Credit may not be earned by passing the examination after having taken the equivalent course. Arrangements for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board College-Level Examination Program, Box 1824, Princeton, N.J. 08540.*

SPECIAL DEPARTMENTAL EXAMINATIONS FOR UNDERGRADUATES

Except for students admitted to the School of Government and Business Administration, credit may be assigned for Special Departmental Examinations, see pages 76-77.

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Except for students enrolled in the School of Education and Human Development or the School of Government and Business Administration, credit is assigned for approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

CREDIT FROM SERVICE SCHOOLS

Except for undergraduates admitted to the School of Education and Human Development or the School of Government and Business Administration, a limited amount of credit may be assigned for selected service school instruction received since 1941. No more than 30 semester hours may be assigned for a combination of service schools and examinations referred to above. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

ADVANCED PLACEMENT

Advanced placement or waiver of a requirement will be granted on the basis of scores on Achievement Tests of the College Entrance Examination Board as follows:

Achievement Test	Minimum Score	Exemption
English Composition	650	Waives Engl 10
English Composition	680	Waives Engl 11 or 12

* See page 142 for additional qualifications for applicants to the School of Government and Business Administration.

European and/or American History	600	Waives Hist 39-40 and/or 71-72
French	650	Waives a two-year language requirement
German	600	
Hebrew	600	
Latin	600	
Russian	700	
Spanish	650	

GRADUATE ADMISSION*

Graduate School of Arts and Sciences—Forms for application for mission or readmission are available at the Office of the Dean of Graduate School of Arts and Sciences, George Washington Univers Washington, D.C. 20052. Completed applications and requests for fell ship support must be submitted by February 15 (February 1 for stud in clinical psychology and art therapy) for admission in the fall seme and by November 1 for the spring semester. Applications for gradu study are acceptable after these dates for admission in the correspond semester and will be reviewed if time permits and if space is availabl the program desired.

School of Education and Human Development—Forms for applica for admission or readmission are available at the Office of the Dean of School of Education and Human Development, George Washington U versity, Washington, D.C. 20052. When completed, these application fo should be submitted to this Office no later than June 1 for the fall semes November 1 for the spring semester and April 1 for the summer session

School of Government and Business Administration—Forms for ap cation for admission or readmission are available at the Graduate Adm sions Office, School of Government and Business Administration, Geo Washington University, Washington, D.C. 20052. For admission in the semester, applications and supporting credentials should be submitted April 1 for the Master of Arts in Health Care Administration and Master of Urban and Regional Planning programs,† and by May 1 for other SGBA masters degree programs. Applications for all masters deg programs are due by November 1 for the spring semester, and by A 1 for the summer sessions. Applications are due from those applying doctoral candidacy by March 1 for the summer sessions and the semester, and by October 1 for the spring semester. Applicants who ceived their undergraduate degrees from foreign universities must sub applications one month earlier in each case.

School of Public and International Affairs—Forms for application admission or readmission are available at the Graduate Admissions Off School of Public and International Affairs, George Washington Univers Washington, D.C. 20052. When completed, these application forms sho be submitted to this Office no later than March 1 (February 1 for ap cants for graduate fellowships or assistantships and foreign applican

* For detailed admission requirements, see the appropriate college or school in this Bull See pages 25-27 for admission requirements for students from foreign institutions.
† Admission to the Master of Urban and Regional Planning program is for the fall semester

Admission is for the fall semester only. All credentials, including transcripts from all institutions attended, Graduate Record Examination scores and letters of reference, must be received before the deadline date.

DIVISION OF UNIVERSITY STUDENTS ADMISSION

Forms for application for admission to *nondegree* status in the Division of University Students are available at and should be returned to the Office of Admissions, George Washington University, Washington, D.C. 20052. When completed, these application forms, with credentials when required, should be received by the Office of Admissions no later than the Friday before the first day of registration (see Calendar, pages 5–7). To avoid paying a late registration fee, every effort should be made to insure that any required credential is in the Office of Admissions prior to registration. No fee is charged for application for admission to this Division. For detailed entrance requirements, see pages 183–84.

Registration in a given course may be denied students in this Division when space is needed for degree candidates.

READMISSION

Students previously registered in the University who were not registered on campus during the immediately preceding semester (summer session excluded), must apply for readmission. Final dates for applying are the same as those for "Undergraduate Admission" (see pages 20–21), or "Graduate Admission" (see page 24). Students who apply as degree candidates and who were previously registered as nondegree students, or who attended one or more institutions of higher learning during absence from the University, must have complete official transcripts sent to the appropriate office at this University from each institution attended. Applications for readmission are considered on the basis of regulations in effect at the time of readmission.

The application fee is waived for students applying for readmission who were registered as degree candidates at the time of last registration at this University and who have not since registered at another institution.

STUDENTS FROM FOREIGN INSTITUTIONS*

Application, required records, and scores on the *Test of English as a Foreign Language* (see page 26) should be received from international students no later than March 1 (February 1 for applicants for graduate study in the School of Public and International Affairs) for the fall semester and October 1 for the spring semester.

George Washington University offers an English-language program for foreign students.

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* For detailed admission requirements, see the appropriate college or school in this *Bulletin*.

Required Records

At the time the application is sent, students must request the educationa institution previously attended to send directly to the appropriate a missions office (see "Undergraduate Admission," pages 20–21, or "Gradua Admission," page 24), copies of official certificates and records listi subjects studied, grades received, examinations taken and degrees r ceived. Certified copies of diplomas and certificates from all secondar schools, colleges, and universities attended are required. Records state examinations and certificates are also required. These records b come the property of the University and cannot be returned.

These documents should be in the language in which the institutio keeps its official records. If they are in a language other than Englis the copies which are sent should be accompanied by an English translatio

Language Tests

Students whose native tongue is not English are required to take the *Te of English as a Foreign Language* (TOEFL). Students are responsible f making arrangements for taking the test by addressing inquiries to the fo lowing agencies:

1. All European countries (including Cyprus, Great Britain, Iceland, a Ireland):

CITO
Postbus 1034
Arnhem, The Netherlands

2. All Middle Eastern and North African countries (except Israel):

American Friends of the Middle East
Abou Shakra Building
Rue Bliss (Manara)
Beirut, 2500 Lebanon

3. Hong Kong:

Institute of International Education
408 J. Hotung House, Fourth Floor
5/15 Hankow Road, Kowloon, Hong Kong

4. India:

Bureau of Educational Research
Ewing Christian College
Allahabad, U.P., 211003, India

5. Republic of China:

Language Center, 2-1 Hsu-chow Road
Taipei, Taiwan (100), Republic of China

All other applicants should address inquiries to TOEFL, Educational Te ing Service, Princeton, N.J. 08540, U.S.A. The completed application fo should be returned to the appropriate agency well in advance of beginning of the semester for which the applicant seeks admission test fee remitted with the application entitles the student to have the t score sent to three different institutions. Registration for the Test

English as a Foreign Language does not constitute application for admission to George Washington University.

The *Bulletin of Information*, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the appropriate admissions office at this University (see "Undergraduate Admission," pages 20–21, or "Graduate Admission," page 24).

In addition to the TOEFL, an admitted student is required to take a test in English as a second language prior to registration. Results of this test will determine the courses the student will be permitted to register for in the program of study. If the knowledge of English is inadequate to enable the student to undertake any academic work, the student will not be permitted to register for any courses other than English and will be required to study English on a full-time basis.

Financial Certificate

If a student plans to enter or remain in the United States to study at this University and the visa status will be either student (F) or exchange visitor (J), a Form I-20 or DSP-66 cannot be issued until the student has been admitted to the University and has completed the Financial Certificate to our satisfaction.

TRANSFER WITHIN THE UNIVERSITY

For information concerning transfer from one college, school, or division to another within the University, see page 48.

REGISTRATION

The dates, hours, and place of registration will be stated in the *Schedule of Classes*, which is available well in advance of each semester.

Students cannot register for on-campus classes without a letter of admission to the University issued by the appropriate admitting office.

No registration is accepted for less than a semester or one summer session.

Students may not register concurrently in this University and another institution without the prior permission of the dean of the college, school, or division in which registered in this University. Registration in more than one college, school, or division of the University requires the written permission of the deans concerned, *prior to registration*. Allowance of

credit for work done concurrently at another institution is at the discre of the appropriate committee.

Eligibility for Registration

Registration for the following categories of campus students is held on days of registration stated in the University Calendar. A student wh suspended or whose record is not clear for any reason is not eligibl register. Registration in a given course may be denied students in Division of University Students when space is needed for deg candidates.

New Student—Upon receipt of a letter of admission, the new studen eligible for registration on the stated days of registration.

Readmitted Student—A student previously registered in the Univer who was not registered for campus courses during the preceding semes or summer session must apply for and receive a letter of readmission f the appropriate admitting office before he or she is eligible for registrat

Continuing Student—The student registered for campus courses in immediately preceding semester or the summer session preceding the semester is eligible to register assuming good standing and enrollment continuing program.

Registration Changes and Withdrawals (See pages 47–48)

Registration for Consortium Courses

Degree students interested in taking courses at any of the other stitutions in the Consortium of Universities of the Washington Metropoli Area, Inc. (see pages 53–54), should consult the program announcements the other institutions. Consortium application forms and instructions m be picked up in the Office of the Registrar after obtaining registrat materials. In order to participate in the Consortium program, students m obtain the approval of an advisor and should ascertain from the dep ment of the institution where the course is taught whether they are eli for the course and whether there is space in the class. Specific inqui should be addressed to the Registrar.

FEES AND FINANCIAL REGULATIONS

Fees paid by students cover only a portion of the cost of the operat of the University. Income from endowment funds, grants, and gifts fr alumni and friends of the institution makes up the difference.

The following fees and financial regulations were adopted for the 1978 summer sessions and the academic year 1978-79. (See page 31 for projected tuition increases for 1979-82.)

Tuition Fees

For undergraduate study in Columbian College of Arts and Sciences, the School of Education and Human Development, the School of Government and Business Administration, the School of Public and International Affairs; and for courses taken on campus by undergraduate students in the College of General Studies:

Full-time program (12 or more semester hours), each semester	$1,500.00
Part-time program, for each semester hour	110.00
Summer Sessions, for each semester hour	105.00

For graduate study* in the Graduate School of Arts and Sciences, the School of Education and Human Development, the School of Government and Business Administration,† and the School of Public and International Affairs: for those registered in the Division of University Students; and for courses taken on campus by graduate students in the College of General Studies:

For each semester hour for which a student registers	$ 110.00
University Center Fee (charged all students registered on campus‡)	
For students registered for 11 or more semester hours on campus:	
Each semester	50.50
For students registered for less than 11 semester hours in a semester on campus:	
For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status:	
Each semester	4.75

Additional Course Fees

In certain courses additional fees, such as laboratory and material fees, are charged as indicated in the course descriptions. These fees are charged by the semester and, unless otherwise indicated, may be defrayed in two payments when the tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Arts	$10.00
Bachelor's, Master's, Education Specialist, Doctor's degrees	25.00
Post-master's Graduate Certificate in Health Care Administration ..	25.00
Fee for binding master's thesis	15.00

*Payment of tuition for a master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered.

†Students entering doctoral programs in the School of Government and Business Administration in 1978-79 will be charged $8,500 for the entire degree program, to be paid in 10 semiannual installments. Contact the School's Doctoral Programs Office.

‡Students in the College of General Studies are charged the University Center fee only when registered for courses on campus.

Fee for microfilm service and printing announcement of final examination (doctoral candidates) ..... 65.

Residence hall fees (see pages 60-61)

Special Fees and Deposits

Application fee* (undergraduate degree candidate), nonrefundable... 10.
Application fee (graduate degree candidate), nonrefundable ..... 25.
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student ..... 100.
Housing deposit, nonrefundable, charged each applicant for residence hall space ..... 100.
Admission tests (when required) ..... 6.00–12.
National Teacher Examinations fee, for Bachelor of Arts in Education degree candidates ..... 9.00–13.
Late-registration fee, for failure to register within the designated period ..... 15.
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 31–32) ..... 15.
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," pages 31–32) ..... 35.
Returned check fee, charged a student whose check is improperly drafted, incomplete, returned by the bank for insufficient funds or for any other reason ..... 15.
Continuous registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements†—due and payable on the official days of registration; nonrefundable ..... 110.
For special physical examination ..... 2.
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both ..... 25.
For each waiver examination to qualify for advanced placement .... 5.
English test for international students (when required) ..... 10.
Laboratory checkout fee, for failure to check out of chemistry laboratory by the deadline date set by the instructor‡ ..... 10.
Transcript fee, for each transcript of record .....
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2 each; fee for each additional copy .....
Replacement of lost or stolen picture identification card .....

Registration for on-campus courses in the University entitles each stude to the following University privileges: (1) the services of the Stude

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* This fee will be increased to $15 beginning with applications for admission to the Sum Sessions 1979

† Payment of the continuous registration fee entitles the student who is granted leave of sence to return and continue work toward a degree under the academic requirements w were in force at the time of the student's first registration. The continuous registration does not apply toward residence requirements for the degree; should a student add a cou after paying a continuous registration fee for the term, the fee will be applied toward tui charges. This fee does not apply to students granted military leave.

‡ A student who drops a chemistry course before the end of the semester must check out of laboratory at the next laboratory period.

er Services Office; (2) the use of the University Library; (3) gymnasium ileges; (4) admission to all athletic contests, unless otherwise specified; ubscription to the *University Hatchet*, the student newspaper; (6) ad- ion to University debates; (7) medical attention as described under lent Health Service. These privileges terminate when the student with- vs or is dismissed from the University.

doctoral Study

rge Washington University doctoral graduates may continue any studies he University without payment of tuition, and enjoy all University ry privileges. Such graduates are required to pay the usual "continuous stration" fee and the University Center fee in order to establish their ve membership in the University. The use of laboratory space and pment is contingent upon availability, and the cost of all laboratory pecial library material is paid by the graduate. Special arrangements such privileges must be made with the dean two months in advance of semester in which the graduate wishes to register. Postdoctoral work n under this privilege may not be applied toward any degree offered by University.

ected Tuition and Fee Increases 1979-82

rder that students and their parents may plan more realistically for a four-year period, tuition increases for the academic years 1979-80, -81, and 1981-82 have been estimated as follows:

ease by year (full-time undergraduate students):

79–80	$200.00
80–81	200.00
81–82	200.00

ease by semester hour (graduate and part-time undergraduate ents):

79–80	7.00
80–81	8.00
81–82	8.00

e University Center fee will be increased for the 1979 summer ses- s and the academic year 1979-80. For students taking 11 or more ester hours, the fee will be $55.50 per semester. Students taking less 11 semester hours will pay $5.25 per semester hour.

is not possible to project future economic data with certainty. The eases outlined above are merely estimates based on present circum- ces and should in no way be interpreted as fixed limits on tuition eases. The University hopes to keep tuition increases as low as pos- , but it is obligated to maintain a sound financial basis. Economic itions in the recent past, particularly as they affect private educational tutions, have been extremely variable, and significant increases in on in excess of the above limits may be required.

Payment of Fees

No student is permitted to complete registration or attend classes u
charges are paid. Tuition and fees for each semester are due and pay
full at the Office of the Cashier at the time of each registration.
should be made payable to George Washington University, wi
student identification number in the upper left-hand corner.

The Student Accounts Office has responsibility for billing and ma
ing student accounts for tuition, various fees, and room and board c
A student registered for six semester hours or more may sign a de
payment contract with the Student Accounts Office at the time o
registration permitting payment of one-half of the total tuition an
(except for fees payable in advance) at the time of registration a
remaining half on or before October 25, 1978 (for the fall semester
March 7, 1979 (for the spring semester). Interest at the rate of 8 pe
per annum on the unpaid balance will be charged from the date of re
tion to the date payment is made.

Students receiving tuition assistance in the form of scholarships, g
ment tuition contracts, or other forms of tuition awards are not perm
to sign deferred payment contracts unless the total tuition and fee ch
exceed the value of the tuition awards by $750 or more. Under suc
cumstances the student may be permitted to pay one-half of the a
due at the time of registration and to defer the balance by sign
deferred payment contract.

Students who fail to make any payment when due will be automa
charged a $15 late-payment fee and will be subject to the interest c
of 8 per cent per annum. Accounts which become 30 days past due w
financially encumbered. In the event a student's account is finan
encumbered, the student forfeits rights to the use of deferred pa
contracts in future semesters, and the Student Accounts Office will
the Registrar to withhold grades, future registration privileges, trans
diplomas and other academic information until the account is
financially. Financial settlement will require payment in full of all am
due to the University in addition to a financial reinstatement fee of

Students auditing courses are subject to all fees charged to st
registered for credit.

Prepaid and Deferred Payment Plans

Several commercial programs for parents who wish to pay for colle
a monthly basis are available. Terms and conditions vary, but most p
a life insurance policy in the contract. For specific details and applic
address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelph
19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James A
Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not main
supply of applications for these various programs, but will be hap
provide guidance to students and parents.

hdrawals and Refunds*

lications for withdrawal from the University or for change in class dule must be made in person or in writing to the dean of the college, ool, or division in which the student is registered. Notification to an ructor is not an acceptable notice (see "Withdrawal," page 47).
authorized withdrawals and changes in schedule, cancellations of ester tuition charges and fees will be made in accordance with the wing schedule for the fall and spring semesters:

omplete withdrawal from the University:

L SEMESTER

Withdrawal dated on or before September 8, 1978	90 per cent
Withdrawal dated September 11 to September 22, 1978	70 per cent
Withdrawal dated September 25 to October 6, 1978	50 per cent
Withdrawal dated after October 6, 1978	none

NG SEMESTER

Withdrawal dated on or before January 19, 1979	90 per cent
Withdrawal dated January 22 to February 2, 1979	75 per cent
Withdrawal dated February 5 to February 16, 1979	50 per cent
Withdrawal dated after February 16, 1979	none

or a *change in status from full-time to part-time student* or for *partial ithdrawal by a part-time student*, the above schedule applies to the ifference in charges between the original program and the adjusted rogram continuing in effect.

student enrolled in an undergraduate full-time program who drops r adds a course and continues to be in a full-time program will have no nancial adjustments of tuition made other than those involving course es.

student who is granted military leave before completing the semester ill receive credits for current charges in accordance with the schedule r complete withdrawal from the University (see No. 1 above). Pay- ents made in excess of the nonrefundable balance will be refunded the student. The nonrefundable balance will be maintained as a ferred credit for use by the student upon return to the University (see Military Leave," page 49).

egulations governing student withdrawals as they relate to residence ll and food service charges are contained in the specific lease arrange- ents.

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case will tuition be reduced or refunded because of absence from s.

ment applies only to the semester for which a registration charge urred and will not be credited to another semester (exception: stu- granted military leave, see page 49).

tions concerning withdrawal and refunds for the summer sessions are stated in the *Sessions Schedule.*

Authorization to withdraw and certification for work done will n
given a student who does not have a clear financial record.
Students are encouraged to provide their own cash funds until
can make banking arrangements in the community.

FINANCIAL AID

FOR UNDERGRADUATE STUDENTS*

George Washington University offers a program of financial assis
of two basic types: awards for academic achievement without refe
to financial circumstances—honor scholarships; and scholarships, gr
loans, and employment based upon demonstrated financial need.

Honor Scholarships—George Washington University honor scholar
of up to $1,000 for the academic year based entirely upon acad
achievement and potential without regard to financial need, are rest
to incoming freshmen and are extremely limited in number.

Need-based Aid—The University offers extensive programs of sch
ships, grants, loans, and employment based upon demonstrated need
University participates in the National Direct Student Loan, Basic E
tional Opportunity Grant, Supplemental Educational Opportunity G
and the College Work-Study programs

Applications and supporting credentials for financial aid must be
by February 1 (entering freshmen) or March 1 (enrolled undergradu
entering transfer students) preceding the academic year of the a
for the fall semester; by November 1, for the spring semester; and
1, for the summer sessions.† A student must reapply for financi
each year.

Complete information concerning financial assistance is contain
the pamphlet "Student Financial Aid," which is available at the Off
Student Financial Aid, George Washington University, Washington
20052.

The following scholarships are available to students in Colu
College of Arts and Sciences, the School of Education and Huma
velopment, the School of Government and Business Administration
the School of Public and International Affairs.

The George Washington University Board of Trustees Scholars
Full- and partial-tuition scholarships, which begin in the fall semest
extend for four successive academic years, provided the holder mai
a *B* average and continues to be in financial need. Candidates must

* For information concerning financial aid for students from foreign countries, see page 4
† Only students who are enrolled in this University for at least eight semester hours in
mediately preceding spring semester or who have applied for financial aid for the follow
semester are eligible for consideration for Summer Sessions financial aid.

elect a curriculum leading to a bachelor's degree in any school listed ve. Students who have demonstrated outstanding ability in inter- olastic speech and debate activities are eligible for the George F. igan Scholarships in Debate which are included among these scholar- ps.

er Scholarships

ievement Rewards for College Scientists (ARCS) Foundation, Inc., cholarship
rman Page Allen Memorial Scholarship Fund (1966)
mni Scholarships
ry J. Anderson Scholarship (1969)
he and Company Scholarships
on Andrews Scholarship (1920)
ry N. Brawner, Jr., Foundation Scholarship Fund (1963)
na K. Carr Scholarships (1932)
ia M. Carter Scholarship (1871)
E. Casassa Memorial Foundation Scholarship (1968)
Omega Alumnae Scholarship (1966)
mbian Women Scholarship Funds
ictoria Briggs Scholarship Fund (1959)
izabeth V. Brown Scholarship Fund (1925)
race Ross Chamberlin Scholarship Fund (1932)
ollege Women's Scholarship Fund (1926)
olumbian Women Members' Scholarship Fund (1961)
cline Hughes Dufour Scholarship Fund (1961)
. Watson W. Eldridge, Jr., and John F. Eldridge Scholarship Fund (1964)
unders of Columbian Women Scholarship Fund (1920)
se Lees Hardy Foundation Scholarship Fund (1957)
lian Young Herron Scholarship Fund (1925)
llie Maynard Knapp Scholarship Fund (1915)
rcia B. Kraft Scholarship Fund (1966)
et McWilliams Scholarship Fund (1954)
rie-Louise Ralph Turner Scholarship Fund (1963)
Daughters of the American Revolution Scholarship (1952)
Davis Scholarship (1869)
ct of Columbia Institute of Certified Public Accountants Scholarship Accounting (1964)
a Constance Drane Scholarship (1957)
t Farnham Scholarship (1871)
al Government Accountants Association—Washington, D.C., Chapter cholarship in Accounting
r Brigham Fisher Scholarship (1951)
e Washington University Tennis Alumni Association Scholarship 74)
ed Green Memorial Scholarship Fund (1959)
on Foundation of the Gridiron Club Scholarship (1975)
Spicker Hampel Scholarship (1949)
O. Hargrove Scholarship (1968)
Lewis Harvey Scholarship (1921)

Hazleton Scholarship (1950)
George F. Henigan Scholarships in Debate (1967)
International Student Scholarships (see page 40)
David B. and James L. Karrick, Jr., Scholarship Fund (1968)
Samuel and Elizabeth Kay Scholarships (1969)
Amos Kendall Scholarship (1869)
L. Poe Leggette Memorial Scholarship Established by WRGW (1968)
Mary and Daniel Loughran Scholarship (1976)
Martha's Marathon Residence Hall Scholarship
Mitchell-Stancioff Scholarship (1967)
A. Morehouse Scholarship (1861)
E. K. Morris Education Fund Scholarships (1972)
Helen Marie and Thomas E. Orr Scholarships (1965)
Hardy Pearce Scholarship Fund (1972)
Phi Delta Gamma Scholarships (1956)
Fred B. and Alma D. Pletcher Scholarship Fund (1968)
Levin M. Powell Scholarships (1886)
Research Assistantships in Operations Research and Related Fields (see page 37)
Resident Assistantships (see page 37)
Henry Whitefield Samson Scholarship Fund (1966)
Lula M. Shepard Scholarships (1946)
Sigma Delta Chi Foundation of Washington, D.C., Scholarships
Margaret Lucille Snoddy Scholarship (1970)
David Spencer Scholarship (1918)
Mary Lowell Stone Scholarship (1893)
Charles Clinton Swisher Scholarships (1941)
U.S. Office of Education Traineeships (1964)
University Players Scholarship in Memory of L. Poe Leggette (1968)
William Walker Scholarship (1824)
Abigail Ann Brown and Henry Kirk White Scholarship Fund (1963)
John Withington Scholarship (1830)
Women's Physical Education Alumnae Association Scholarship (1964)
William G. Woodford Scholarship (1969)
Ellen Woodhull Scholarship (1919)
Zonta Club Scholarship (1950)

Grants

The following funds have been established to meet the special ne... disadvantaged students from the District of Columbia Inner-City a... Washington metropolitan area.

George Washington University's Educational Opportunity Program T... Grants (1968)
Key Club of Walt Whitman High School, Bethesda, Md., Grant (1968)
Marriott Foundation Grant (1968)

FOR GRADUATE STUDENTS*

The George Washington University program of financial assistan...

* For information concerning financial aid for students from foreign countries, see page ...

uate students includes assistantships, fellowships, traineeships, grad- scholarships, research appointments, part-time employment, and loans. lication for admission to graduate study is a prerequisite for con- ration.

pplication and correspondence concerning assistantships, fellowships, neeships, or graduate scholarships should be sent directly to the dean e school concerned, and addressed to George Washington University, hington, D.C. 20052. Unless otherwise specified, application and sup- ing credentials should be submitted no later than February 1 pre- ng the academic year for which the award is made.

istantships

esearch Assistantships in Operations Research and Related Fields—ilable to graduates, and to undergraduates on the junior and senior ls, in any school of the University. Research assistants are expected ork 20 hours a week conducting research in support of an established arch program, in programming or in conducting individual research on pproved research project. Stipends range up to $8,000, depending on status of the student and the tenure of the appointment (9–12 months). her information and applications are available from Director, Institute Management Science and Engineering, School of Engineering and Ap- l Science, George Washington University, Washington, D.C. 20052.

esident Assistantships (men and women)—Available to graduate stu- s and seniors in any field of study who are interested in working with tudent personnel program in University residence halls. Specific duties with the position, but basically consist of counseling, advising student ps, and administration. Remuneration includes full tuition and a fur- ed room for the academic year. All positions are part-time, and staff bers are required to enroll as full-time students in degree granting rams. Application should be completed before March 1. Further in- ation may be obtained from the Office of the Director of Housing.

gton County—George Washington University Cooperative Assistant- p Program
h Care Administration Research Assistantships
nal League of Cities/George Washington University Assistantship
n Affairs Assistantship

wships, Internships, Traineeships, Special Programs

following fellowships, internships, and traineeships are available to nts in the Graduate School of Arts and Sciences, the School of Educa- and Human Development, the School of Government and Business Ad- tration, and the School of Public and International Affairs. The Uni- ty also offers many other fellowships which are available to students se colleges and schools.

iversity Fellowships—Available to graduate students in master's and ral programs in most departments of the University. Fellowships are on scholarship and each fellow may receive a stipend, tuition allow- and course fees.

duate Teaching Assistantships—Available to graduate students in

master's and doctoral programs in most departments of the Universi
graduate teaching assistant receives financial compensation for a
nated unit of service to the assistant's major department of instruct

Research Traineeships—Available under numerous sponsored pro
in a number of departments. Currently, the basic medical science d
ments and the Departments of Psychology and Speech and Drama
such programs. Stipends vary; information is available from the d
ments and the Office of the Dean of the Graduate School of Art
Sciences.

Achievement Rewards for College Scientists (ARCS) Foundation,
Fellowship
Robert A. Aleshire Fellowship Fund (1971)
American Association of Collegiate Schools of Business Fellowship
American Civilization Fellowships
American Civilization Internships (Smithsonian Institution-George W
ington University Cooperative Program)
American Iron and Steel Institute Fellowship
Arthur Anderson & Co. Doctoral Fellowship
Aryamehr Research Fellowships
Winfield Scott Blaney Fellowship in International Affairs (1961)
**Oliver T. Carr, Sr., Memorial Fellowship in Urban and Regional Pla
(1973)**
Thomas Alva Edison Fellowship
Elementary Teacher Education Internships
Ernst & Ernst Grant to Doctoral Candidates in Business or Economics
Health Care Administration Fellowships
International Student Fellowships (see page 40)
Richard D. Irwin Doctoral Fellowships
Isabella Osborn King Research Fellowships (1927)
Loula D. Lasker Fellowships in Housing, City Planning, or Urban Re
Mary and Daniel Loughran Graduate Scholarship (1976)
Mellon Foundation Fellowships
Minorities in Planning and Related Professions Program
National Association of Purchasing Management Fellowship
National Historical Publications Commission-George Washington
versity Cooperative Research Fellowships
National Science Foundation Graduate Fellowships
Resources for the Future, Inc., Fellowship Prize
Rose Bibliography Internships
Thomas Bradford Sanders Fellowships (1928)
Scottish Rite Foundation Fellowships
U.S. Office of Education Fellowships (1964)
U.S. Public Health Service Traineeships
U.S. Public Health Service Traineeships in Comprehensive Health Pla
Urban Studies Fellowships of the Department of Housing and Urba
velopment
Urban Transportation Center Fellowship

Graduate Scholarships

Armed Forces Health Professions Scholarship Program (The Unifo

Services Health Professions Revitalization Act of 1972—Public Law 92-426)
Barbee Sculptor Scholarship (1975)
Emma K. Carr Scholarships (1932)
Paul H. and Margaret M. DeMaine Scholarships (1967)
District of Columbia Institute of Certified Public Accountants Scholarship in Accounting (1964)
Mary and Daniel Loughran Graduate Scholarship (1976)
Foster G. McGaw Scholarship in Health Care Administration (1971)
Mitchell-Stancioff Scholarship (1967)
Paul Pearson Scholarship Fund (1940)
Phi Delta Gamma Scholarship Fund (1968)
Voorhees Scholarships
Volcott Foundation Scholarships

ponsored Awards for Graduate Study

nformation regarding awards sponsored by foundations, professional and arned societies, industries, and others which may be used in support of raduate study is available at the Graduate Fellowship Information Cen- r, 2025 H St., N.W., for students enrolled at George Washington niversity. Information is also available on distinguished programs such as e Rhodes, Marshall, National Science Foundation, Fulbright, Rotary ternational, and Danforth, as well as many others.
As deadlines for application vary, qualified students should make in- uiries well in advance of the year of planned graduate study.

DAN FUNDS

ne following loan funds are available to undergraduate and/or graduate udents in Columbian College of Arts and Sciences, the Graduate School Arts and Sciences, the School of Education and Human Development, e School of Government and Business Administration, and the School Public and International Affairs. A separate application must be sub- tted for all loan programs. Applications for the National Direct Student an should be filed no later than April 1 for the following academic year. mplete information is contained in the pamphlet "Student Financial d," which is available in the Office of Student Financial Aid, George ashington University, Washington. D.C. 20052.

merican Medical Association Nursing Home Administration Loan Fund
orge F. Henigan Loan Fund (1975)
ernational Student Loan Fund (1967)
nne Jacobs Student Loan Fund (1974)
K. Kellogg Foundation Hospital Administration Loan Fund
sie B. Martin Loan Fund (1967)
ional Direct Student Loan Program
s H. Stearman Emergency Loan Fund
am Miller Stout Memorial Loan Fund (1973)
versity Student Emergency Loan Fund

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inqu should be addressed to the Office of Student Financial Aid. In addition, Student and Alumni Career Services Office maintains a registry of full-time and part-time positions available in the Washington area undergraduate and graduate students.

After registration, students may apply at the Student and Alumni Ca Services Office, Woodhull House, 2033 G Street, N.W., for interviews referrals to positions for which they are qualified.

INTERNATIONAL STUDENTS

Undergraduate international students with proven financial need who h completed one semester of full-time work (15 hours) at this Univer with a *B* average are eligible to apply for the Board of Trustees Scho ships. Scholarships are awarded in the spring for the following acade year. See instructions for applying for undergraduate financial aid, p 34–35.

Limited awards for graduate teaching assistantships and Univer fellowships are the responsibility of the chairman of the department dean of the school in which the degree is to be earned. Work a teaching fellow requires excellent knowledge of English—both spo and written.

Long-term loan funds for undergraduate and graduate international dents are limited in amount and are available only to those foreign-b persons who have established resident status in the United States thr the Immigration and Naturalization Service.

We suggest that students who wish to study in the United States h available sufficient funds to cover expenses for one full year before tempting to enter a college or university. The cost at this University one academic year (September-May) is approximately $6,000. This estim includes room and board, tuition, books, clothes, and incidental expen no travel, holiday, or medical expenses are included.

LAW ENFORCEMENT EDUCATION PROGRAM

This program of grants and loans, authorized under the provisions of Omnibus Crime Control and Safe Streets Act of 1968, is intended to h pay the cost of educational expenses for employees of state and local cr nal justice agencies. Studies may be full- or part-time in a wide rang subject areas and degree goals. Applications and further information available from the LEEP Coordinator, Graduate School of Arts Sciences.





RIZES

Accounting Prizes—Three prizes awarded annually by the Department of Accounting—one each to the undergraduate Accounting major with the highest scholastic standing, to the candidate for the degree of Master of Business Administration with the highest scholastic standing in the Accounting concentration, and to the Doctoral candidate with a field in Accounting who has the highest scholastic standing at the completion of the General Examination.

Alpha Chi Sigma Prize—Awarded annually by the Alpha Pi Chapter to the student who has attained the highest academic record in courses in Chemistry. The name and year of graduation of the student is inscribed on a bronze plaque. The winner must have had at least 16 hours in chemistry, including the final semester at this University.

American Institute of Chemists Prize—A medal awarded annually to the graduating student majoring in chemistry who excels in scholarship, integrity, and leadership.

Department of Art Prizes—Two prizes—one for an undergraduate majoring in Art History and one for an undergraduate majoring in Fine Arts—awarded annually to the most promising students, as determined by the departmental faculty.

The Walter G. Bryte, Jr., Achievement Award—Provided by Walter G. Bryte, Jr., Colonel, U.S. Air Force (retired), first Professor of Air Science at George Washington University. The award is presented annually primarily to that undergraduate residence hall, secondarily to any other activity at the University, which has shown under the leadership of its elected or designated head, the most improvement or excellence in its support of the principles and aims of the United States of America and George Washington University. The hall or other activity will be awarded a cash prize, and the name of its leader and the hall or activity will be engraved on a silver trophy.

Byrne Thurtell Burns Memorial Prize—Awarded to the senior majoring in chemistry who shows the greatest proficiency in organic chemistry, as evidenced by a comprehensive examination, and who possesses such qualifications of mind, character, and personality as to give promise of future achievement.

Business Administration Prize—Awarded annually by the Department of Business Administration to the outstanding graduating senior in business administration on the basis of scholarship, leadership and service to the University.

Wilbur J. Carr Prize—Established in 1962 by Edith K. Carr, former Trustee of the University, in memory of her distinguished husband, who was graduated from the School of Comparative Jurisprudence and Diplomacy in 1899. It is awarded annually to that student in the graduating class of the University who has demonstrated outstanding ability in the study of international affairs and who has given evidence of possessing in marked degree the qualities which produce the good citizen and the dedicated public servant.

The Chemical Rubber Co. Freshman Chemistry Achievement Prize—A

Handbook of Chemistry and Physics awarded annually to the freshr student who has demonstrated the greatest achievement in Chemi 15-16.

John Henry Cowles Prizes—Two prizes, established by John H. Cow Grand Commander of the Supreme Council of Thirty-third Degree (Mot Council of the World) of the Ancient and Accepted Scottish Rite of F masonry, Southern Jurisdiction of the United States of America. Awar annually to the senior in the School of Government and Business A ministration and to the senior in the School of Public and Internatio Affairs with the highest academic averages.

DeWitt Clinton Croissant Prize—Awarded annually to the undergradu student enrolled in a course in drama or active in University dramatics w submits to the English Department the best essay on drama or the thea

E.K. Cutter Prize—Established by Marion Kendall Cutter "for excelle in the study of English." Awarded to the member of the graduating c whose record in English, combined with general excellence, shows n marked aptitude for and attainment in English studies.

Isaac Davis Prizes—Established in 1847 and awarded annually to three seniors who have made the greatest progress in public speaking wh enrolled in the University. Awards are to be determined by a pub speaking contest in which the participants deliver original orations. C members of the senior class of Columbian College of Arts and Scien who are candidates for the degree of Bachelor of Arts or Bachelor Science are eligible to compete.

Henry Grattan Doyle Memorial Prize—Established in memory of He Grattan Doyle, a former Dean of Columbian College. Awarded annually an outstanding senior for excellence in Spanish.

Elton Prize—Established by the Reverend Romeo Elton, of Exeter, E land, and awarded annually to the student with the highest average in most advanced course in the Greek language and literature.

Jesse Frederick Essary Prize in Journalism—Established by Helen Ess Murphy and awarded annually to a student who has given promise sound citizenship and who submits the best printed and published evide of ability in "forthright reporting" and good journalistic writing, in a dent publication or elsewhere.

Willie E. Fitch Prize—Established by James E. Fitch in memory of son. Awarded annually to a senior student for the best examinatio chemistry.

Charles E. Gauss Prize—Established in honor of Charles E. Ga Elton Professor of Philosophy from 1945 to 1964. Awarded annually graduating senior for excellence in philosophy.

Alice Douglas Goddard Prize—A memorial established by Frede Joseph Goddard, of Georgetown, D.C. Awarded annually to the se student making the highest average in American literature.

Edward Carrington Goddard Prize—Established by Mary William Goddard, Alice Douglas Goddard, and Frederick Joseph Goddard, Georgetown, D.C., in memory of Edward Carrington Goddard, class 1881. Awarded to the junior or senior student making the highest aver in the French language and literature.

Morgan Richardson Goddard Prize—A memorial established by M Williamson Goddard, Alice Douglas Goddard, and Frederick Joseph G

rdard, of Georgetown, D.C. Awarded to the junior or senior student making the highest average in the following fields: business administration, economics, international business, or public accounting.

Government Employees Insurance Company and Affiliates Achievement Awards—A $200 cash award is given in each of the following five areas: Health Care Administration, Management Science, Public Administration, Business Statistics, and Urban and Regional Planning.

Gardiner G. Hubbard Memorial Prize in United States History—Established by Gertrude M. Hubbard in memory of her husband and awarded annually to that member of the graduating class majoring in history who has maintained the highest standing in courses in United States history.

International Business Prize—Two prizes awarded annually by the School of Government and Business Administration to students specializing in international business, one awarded to a graduating senior and one awarded to a graduate student.

David Lloyd Kreeger Prizes in Art—Five prizes given by Mr. Kreeger, three in the fine arts and two in art history (including museology). Fine arts prizes are awarded to a senior or graduate student in painting, sculpture, and graphics or design. One prize in art history is awarded to a senior and one to a graduate student. Candidates for the prizes must submit original papers or works of art. Winners are selected by distinguished representatives of the field of art in the Washington, D.C., area.

Minna Mirin Kullback Memorial Prize—Established in 1968 by Solomon Kullback in memory of his wife. Awarded annually by a committee of faculty members of the Department of Statistics to a full-time undergraduate or graduate student majoring in statistics, who will have completed 18 semester hours of statistics courses by the end of the spring semester.

John Francis Latimer Prize in Classics—Established in 1973. Awarded to a graduating senior who has made the most outstanding record as a major in the Department of Classics.

Vivian Nellis Memorial Prize—Awarded to a student in the English Department who has shown special promise in the field of creative writing.

Phi Delta Kappa Prize—Awarded annually by Beta Gamma Chapter to an outstanding senior in the teacher education program in the School of Education and Human Development.

Phi Eta Sigma Prize—A choice book selected from the field of the recipient's major, awarded annually by the George Washington University Chapter to the student attaining the highest scholastic average in the first full semester of work. The winner's name is engraved on a plaque in the Office of the Dean of Columbian College of Arts and Sciences.

Pi Lambda Theta Prize—Awarded annually by Alpha Theta Chapter to an outstanding senior in the teacher education program in the School of Education and Human Development.

Psi Chi Prizes—Two prizes awarded annually by the George Washington University Chapter to the best undergraduate student in experimental psychology and to the M.A. degree candidate or second-year graduate student submitting the best thesis or research project in psychology.

Ruggles Prize—Established by Professor William Ruggles in 1859, awarded annually to a candidate for a bachelor's degree for excellence in mathematics.

Hermann and Johanna Richter Schoenfeld Prize—Established in gra
appreciation of the inspired teaching and devotion to his students o
Hermann Schoenfeld, who for more than 20 years until his death in
headed the Department of German. Hermann Schoenfeld, Ph.D., L
was widely recognized as a scholar of distinction whose presence o
faculty added prestige to the University. This prize is given annually
member of the graduating class for excellence in historical and cu
phases of German studies.

Society of Colonial Wars in the District of Columbia Prize—A
medal awarded to a candidate for a graduate degree who, in the judg
of the faculty of the Department of History, submits a thesis or diss
tion demonstrating excellence in historical research in American Col
history. The University reserves the right to withhold the award
thesis or dissertation attaining the required degree of excellence is
mitted.

Staughton Prize—Established by the Reverend Romeo Elton and awa
annually to the student making the best record in the most adva
courses in the Latin language and literature.

James MacBride Sterrett, Jr., Prize—Established in 1911 by Profe
Sterrett in memory of his son. Awarded annually to the student who
tains the highest average in Physics 1 and 2.

Charles Clinton Swisher Historical Club Prize—Established in 193
the Charles Clinton Swisher Historical Club and augmented in 1941 by
bequest of Professor Swisher. Awarded annually to the student who
mits the best essay covering some phase of medieval history.

James H. Taylor Graduate Mathematics Prize—Established in memor
James H. Taylor, former Professor of Mathematics at the Univer
Awarded annually to a graduate student for outstanding performanc
mathematics.

Benjamin D. Van Evera Memorial Prize—Awarded annually to
Graduate Teaching Fellow in Chemistry selected as the most effe
teacher during the current academic year.

The Wall Street Journal Leadership Prize—Awarded annually to a gr
ating senior in the Bachelor of Business Administration degree prog
for outstanding leadership and service to the University.

Thomas F. Walsh Prize—Established in 1901 and awarded annuall
the student who submits the best essay in Irish history.

The Washington Society of Investment Analysts Award—A $500 a
given to a full-time candidate for the Master of Business Administra
degree who is interested in finance and investments, has a high un
graduate academic record, and demonstrates financial need.

Alexander Wilbourne Weddell Prize—Established in 1923 by Vir
Chase Weddell in memory of her husband. Awarded annually to a de
candidate who writes the best essay on "the promotion of peace an
the nations of the world." The prize essays shall become the propert
the University and shall not be printed or published without the wri
consent of the University. The University reserves the right to withh
the award if no essay attaining the required degree of excellence
submitted.

EGULATIONS

udents enrolled in the University are required to conform to the follow-
regulations and to comply with the rules and regulations of the college,
hool, or division in which registered.

Students who withdraw or are suspended, or who, for any other reason,
e not registered at the University for one semester or more, may re-enter
d continue work only under the regulations and requirements in force
the time of return.

f a student knowingly makes a false statement or conceals material
ormation on an application for admission, registration card, or any other
iversity document, the student's registration may be canceled. If such
sification is discovered after the student has established an academic
cord at the University, the student may be subject to dismissal from
e University. Such a student will be ineligible (except by special action
the Faculty) for subsequent registration in the University.

TTENDANCE

udents may not attend classes until registration is completed and fees
e are paid. They may attend only those classes for which they are
gistered. Regular attendance is expected. Students may be dropped from
y course for undue absence.

CHOLARSHIP REQUIREMENTS

udents who fail to maintain the scholarship requirements of the college,
hool, or division in which registered may be dismissed from the Uni-
ersity.

rades

rades are mailed to students through the Office of the Registrar at the
ose of each semester. They are not given out by instructors.

NDERGRADUATE

he following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfac-
ry; *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*,
redit; *NC*, No Credit. Except for courses which specifically state that
petition for credit is permitted, a candidate for a degree at this Univer-
ty may not repeat for credit a course in which a grade of *D* or better was
ceived, unless required to do so by the department concerned. A written
atement to this effect must be submitted to the Registrar by the ap-
ropriate department chairman.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Mi
Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal.
for courses which specifically state that repetition for credit is perm
candidate for a degree at this University may not repeat for credit a
in which a grade of *C* or above was received, unless required to do
the department concerned. A written statement to this effect m
submitted to the Registrar by the appropriate departmental chairma

INCOMPLETE/AUTHORIZED WITHDRAWAL

When another grade has not been assigned, the symbol *I* (Incomplet
symbol *W* (Authorized Withdrawal), or the symbol *F* (Failure, in thi
because of unauthorized withdrawal) will be recorded. The symbol
cates that a satisfactory explanation has been given the instructor f
student's inability to complete the required work of the course. A
option of the instructor, the grade of *I* may be recorded if a studen
reasons beyond the student's control, is unable to complete the wo
the course, and if the instructor is informed of, and approves, such re
before the date when grades must be reported. The grade may be
only if the student's prior performance and class attendance in the c
have been satisfactory. Any failure to complete the work of a course
is not satisfactorily explained to the instructor before the date when g
must be turned in will be graded *F*. If acceptable reasons are later
sented to the instructor, that instructor may initiate an appropriate
change.

REMOVING AN INCOMPLETE

For information concerning the removal of a grade of Incomplete fr
student's record, consult the regulations of the college, school, or div
concerned.

THE QUALITY-POINT INDEX

Scholarship is computed in terms of the quality-point index, obtaine
dividing the number of quality points by the number of semester h
for which the student has registered, both based on his or her record in
University. Quality points are computed from grades as follows: *A*,
points; *B*, three points; *C*, two points; *D*, one point; *F*, no points, for
semester hour for which the student has registered. Courses marke
I, *NC*, or *CR* are not considered in determining the index, except
courses marked *I* will be considered when a formal grade is recor
With the exception of Consortium courses, grades in courses take
other institutions are not considered in computing the quality-point ind

Final Examinations

Final examinations for undergraduate courses are scheduled by the O

the Registrar. Examinations for courses numbered 201 or above are heduled, if desired, by the individual department or instructor.

cademic Dishonesty

e University community, in order to fulfill its purposes, must establish d maintain guidelines of academic behavior. All members of the com- unity are expected to exhibit honesty and competence in their academic ork. Incoming students have a special responsibility to acquaint them- ves with, and make use of, all proper procedures for doing research, iting papers, and taking examinations.

Members of the community will be presumed to be familiar with the per academic procedures and held responsible for applying them. liberate failure to act in accordance with such procedures will be nsidered academic dishonesty. Acts of academic dishonesty are a legal, oral, and intellectual offense against the community and will be prose- ted through the proper university channels.

Copies of the University policy on academic dishonesty can be ob- ned from the following officers: all department chairmen, all academic ans, and the Vice President for Academic Affairs.

TUDENT CONDUCT

l students upon enrolling and while attending The George Washington niversity are subject to the provisions of the *Statement of Student ights and Responsibilities* which outlines student freedoms and responsi- lities of conduct, the Judicial System for Non-Academic Student Dis- pline, and other policies and regulations as adopted and promulgated by ppropriate University authorities. Copies of these documents may be btained at the Office of the Vice President for Student Affairs. Sanctions r violation of these regulations may include permanent expulsion from e University which may make enrollment in another college or university fficult. Regulations or requirements applicable only to a particular pro- am, facility, or class of students may not be published generally, but ch regulations or requirements shall be published in a manner reason- ly calculated to inform affected students.

ITHDRAWAL

ithdrawal from a course or from the University requires the permission the dean of the college, school, or division in which the student is regis- red. Permission to withdraw from the University will not be granted a udent who does not have a clear financial record (see "Payment of es").

Each college, school, and division of the University sets deadline dates r each semester concerning withdrawal. Withdrawal between these dates d the end of the semester is permitted only in exceptional circum- nces.

All charges for courses dropped without the approval of the dean must met by the student. Such unauthorized withdrawal will result in the cording of a failing grade for the course or courses.

CHANGES IN PROGRAM OF STUDY

Changes within a College, School, or Division—A student may stitute one course for another, drop courses (see "Withdrawal" change status from credit to audit or from audit to credit without proval of the dean of the college, school, or division in which regis

Change from one section to another of the same course may b with the approval of the dean and the department concerned.

Change from one major field to another within the same col school may be made with the approval of the dean.

Transfer within the University—Application for transfer to anot lege, school, or division must be made to the appropriate admittin on the form provided by the deans concerned. Transfer from the priate preprofessional curriculum in Columbian College to bachelo gree candidacy in the School of Public and International Affairs m place upon the completion of 60 or more semester hours of cours and of the necessary procedures required by the particular school.

With the exception of the School of Government and Business A stration which limits a student to 15 semester hours earned i matriculated status, a maximum of 45 semester hours earned Division of University Students may be applied toward a bac degree in the other degree-granting colleges or schools of the Univ Work done in the Division of University Students will not be c toward a graduate degree unless prior written approval, obtained the relevant degree-granting college or school, has been filed Office of the Dean of the Division of University Students (see page

Students transferring within the University are advised to study fully the requirements listed below under the heading "Graduatio quirements," and to note that, unless otherwise specified, in all t graduate divisions, 30 semester hours, including at least 12 semester in the major field, must be completed while registered in the scho college from which the degree is sought. Upon transfer the student s consult the dean concerned and understand clearly the require which must be fulfilled.

CREDIT

Credit is given only after registration for a course and satisfactory co tion of the required work, or upon the assignment of advanced sta in accordance with the regulations of the several colleges, schools divisions.

Auditing—A person who has been admitted to the University m registered, with the permission of the instructor, as an auditor in a (no academic credit). An auditor is not required to take active part pass examinations. A student who takes a course as an auditor ma repeat it later for credit.

POST-ADMISSION TRANSFER CREDIT

Students who plan to attend another institution and apply credit so e

ward graduation from this University, must first secure the written ap-
val of their dean. In no event will credit in excess of what might be
ned in a similar period in this University be recognized.

LANCE SHEET

request, the Office of the Registrar will issue to undergraduate degree
didates a balance sheet showing the amount of work completed and the
uirements remaining to be met for the degree. A second balance sheet
ssued only if the student changes major or degree objectives.

ANSCRIPTS OF RECORD

cial transcripts of student records are issued on written request of the
lent or former student who has paid all charges, including any student
n installments, due the University at the time of the request. A fee of
is charged for each transcript. When more than two transcripts are
ered at the same time, a $2 fee is charged for each of the first two
nscripts and a $.50 fee is charged for each additional transcript. Partial
nscripts are not issued.

NTINUOUS REGISTRATION

gree candidates are expected to maintain continuous registration until
degree requirements are satisfied. Students who have completed their
rse requirements (including the thesis) must maintain continuous regis-
tion by paying the "continuous registration" fee (see page 30). By failing
register for one semester or more, the student breaks registration and
st be readmitted (see "Readmission," page 25). A readmitted student
subject to the regulations and requirements in force at the time of
dmission.

Students must be registered during the summer if they are taking
rses, are taking required examinations, are receiving guidance on theses
dissertations, or are expecting to be graduated at the end of the
mmer Sessions.

LITARY LEAVE

student called to active duty may be granted military leave for the
iod of active duty, upon presentation to the dean of a copy of the
itary orders and a petition for such leave. The maintenance of "continu-
registration" is not required of the student on military leave; however,
student must apply for readmission to the University well in advance
he semester of expected return. Payments for tuition and fees which are
refunded to the student at the time military leave is granted will be
ntained as a deferred credit for the student's account and used upon
rn to the University.

GRADUATION REQUIREMENTS

Degrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student mu
met the admission requirements of the college or school in whic
tered; completed satisfactorily the scholarship, curriculum, reside
other requirements for the degree for which registered; and be fre
all indebtedness to the University. Registration, either for cours
or on the "continuous registration" fee basis, is required for the se
or summer session at the close of which the degree is to be confe

Application for Graduation—An "Application for Graduation'
must be filed and the appropriate fee paid at the time of registrati
the last semester or summer session of the senior or final year. St
completing degree requirements during the Summer Sessions w
awarded diplomas (no formal convocation) dated September 30, *pr*
they have completed all degree requirements and have applied for g
tion as a part of registration for the Summer Sessions.

Scholarship—The student must meet the scholarship requiremen
the particular degree for which registered.

Curriculum—Minimum curriculum requirements for each degre
stated under the college or school offering work in preparation fo
degree.

Residence—Unless otherwise specified, in all undergraduate divi
of the University, a minimum of 30 semester hours, including at lea
hours in the major field, must be completed while registered in the s
or college from which the degree is sought. This requirement appli
students transferring within the University as well as to students t
ferring from other institutions. Unless special permission is grante
the dean of the college or school concerned to pursue work elsew
the work of the senior or final year must be completed in the colle
school from which the degree is sought.

The graduate student must meet the residence requirements fo
particular degree for which registered.

National Teacher Examinations—All candidates for the degree of B
lor of Arts in Education are required to take the National Te
Examinations.

Attendance and Conduct—The University reserves the right to r
to confer a degree upon a candidate whose attendance or conduct has
unsatisfactory.

Thesis or Dissertation—A thesis or dissertation submitted in p
fulfillment of requirements for a degree must be presented in its
form to the dean of the college or school concerned no later than the
specified in the University Calendar.

Accepted theses and dissertations, with accompanying drawing
come the property of the University and are deposited in the Univ
Library, where the duplicate copies are bound and made available
circulation. See the appropriate college or school in this catalogue
regulations governing theses and dissertations.



ONORS

TH DISTINCTION

all undergraduate divisions of the University a baccalaureate degree ay be conferred "With Distinction," at the discretion of the faculty, if a dent meets the specific requirements of the student's college or school follows:

1. Columbian College of Arts and Sciences or School of Public and ternational Affairs—the attainment of the grades of *A* in 60 per cent of e courses taken at GW; or
2. School of Education and Human Development or School of Govern- ent and Business Administration—the attainment of a quality-point index 3.50 or higher in all course work taken at GW.

To be eligible a student must have completed at this institution at least le-half of the courses required for the degree.

ECIAL HONORS

pecial Honors may be awarded by the faculty to any member of the aduating class for outstanding achievement in the student's major field recommendation of the major department. The student must fulfill all the following requirements:

1. Candidacy for Special Honors must be approved by the faculty mem- er representing the major department or field not later than the beginning the senior year.
2. Such other conditions as may be set at the time the candidacy is pproved must be met.
3. At least one-half of the courses required for the degree must have een completed at GW.
4. The specific requirement of the college or school in which registered ust be fulfilled, as follows: (a) Columbian College of Arts and Sciences the School of Public and International Affairs—attainment of the rades of *A* or *B* in 50 per cent of the courses taken at this institution; or) the School of Education and Human Development or the School of overnment and Business Administration—maintain a quality-point index at least 3.0 on all course work taken at GW.

EPARTMENTAL HONORS

he Department of History offers Departmental Honors if students meet ecific requirements. For details, see the **Department of History, page** 6.

HE LIBRARY

l students registered in the University have the privilege of using the iversity Library. Its stacks are open, and all students are welcome to owse. A card denoting approved enrollment for the current semester ust be presented when books are borrowed for outside use.

The loan period for stack books is 14 days. Any book which circu is subject to recall by the library if needed for reserve or other use serve books must be used in the reserve reading room when the lib is open, except that they may be withdrawn for overnight use begin at 8:30 p.m. Transcripts of grades are withheld until a student's lib record is clear, with all borrowed books returned and any fines pa

All students using the University Library are expected to be fam with its detailed regulations, available at any of the library's service de

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any stu from the University, or from any class or classes, whenever, in the inte of the student or the University, the University Administration deem advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools and divisions reserve right to modify or change requirements, rules and fees. Such regulat shall go into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs out notice whenever circumstances warrant such changes.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to ins tional policies governing access to and release of student education ords maintained by educational institutions which are recipients of fe funds. The University complies with this statute, which states, in that such institutions must:

1. afford students access to education records directly related to the
2. offer students an opportunity for a hearing to challenge such re as inaccurate, misleading, or otherwise inappropriate;
3. receive students' written consent before releasing information their education records to persons outside the University, exce provided by the Act and except for directory information as indi below. Information may be furnished to a student's parents wi such written consent only upon certification of the student's fi cial dependency; and
4. comply with a judicial order or lawfully issued subpoena to r a student's record, notifying the student of this action.

The University will release the following directory information upon quest: name, local address, and telephone number; name and address of t of kin; dates of attendance; school, college, or division of enrollment; d of study; credit hours earned; degrees earned; honors received; par- pation in organizations and activities chartered or otherwise established the University (including intercollegiate athletics); and height and ight of members of athletic teams. A student who does not wish such ectory information released must file written notice to this effect in Office of the Registrar.

Copies of the University's full policy statement on the release of student ormation may be obtained from the Office of the Registrar.

OPERTY RESPONSIBILITY

e University is not responsible for the loss of personal property. A Lost d Found Office is maintained on campus in the Safety and Security ice.

IVERSITY POLICY ON DRUGS

he University cannot condone violations of law, including violation of se laws which proscribe possession, use, sale, or distribution of drugs. nbers of the academic community should know that administrative on, which may include dismissal from the residence halls, revocation ther privileges, or suspension or dismissal from the University, may aken in order to protect the interests of the University and the rights thers.

SOCIATIONS AND SERVICES

SORTIUM OF UNIVERSITIES OF THE HINGTON METROPOLITAN AREA, INC.

universities in Washington, D.C.—American University, Catholic rsity of America, George Washington University, Georgetown Uni- y, and Howard University—are associated in a Consortium through they coordinate the use of their respective facilities; Gallaudet ge, Mount Vernon College, and Trinity College are associate mem- f the Consortium. Students in approved programs leading to degrees y one of these institutions have the opportunity to select from the ned offerings of all the particular courses which best meet their

icipation is limited to degree candidates. The following, how-

ever, are excluded: students in canon law, dentistry, medicine, theology. Law students are also excluded from participation, except candidates for the degree of Master of Laws at George Washington versity and Georgetown University.

In special courses involving private instruction (such as music or or tutorial study, if a special fee is charged, this fee is not covered by Consortium agreement and must be paid by the individual student to institution administering the course. A student interested in registe for Reserve Officer Training Corps (ROTC) courses should consult Registrar at the institution in which the student is enrolled.

Students are encouraged to study the announcements of programs o the participating institutions. See page 28 for information concer registration for Consortium courses.

Registration forms and instructions are available from the registra the institution in which the student is enrolled. Students register and tuition at their own institutions for all Consortium courses; course fee payable to the visited institutions.

THE SPEECH AND HEARING CLINIC

Director of Speech Pathology and Audiology J.W. Hillis

The Speech and Hearing Clinic offers diagnostic and remedial work children and adults with such communication difficulties as stutte lisping, cleft-palate speech and cerebral-palsied speech; and with v articulatory and hearing problems. Diagnostic and remedial work is available for persons with nonstandard language usage due to such ditions as hearing loss, brain damage, mental retardation, and env mental factors.

Fees—The fee for an initial evaluation is $35. Fees for additional cialized testing are dependent on the testing involved. The fees for vidual speech or hearing therapy range from $4 to $25 a session. Fee reduced for full-time students enrolled in the University and for pe receiving group therapy. Fees are payable at the Office of the Ca

THE READING CENTER

Director F.E. Hesser

The Reading Center offers individual diagnostic and corrective se for all levels: primary, elementary, secondary, and adult. In addition cial reading improvement classes are conducted for high school and lege students as well as other adults.

A complete diagnosis includes psychological tests; vision, hearing, nance, and spelling tests; and various types of reading achievement aptitude tests. Results are interpreted, and a written report is pres in conference with the parents or the individual.

The special reading improvement classes for high school students, lege students, and other adults are offered throughout the year at s

tervals. Emphasis is placed on improvement of vocabulary, speed, com-
ehension, and study skills. Instruction in spelling is also provided as
eeded. Mechanical aids such as the tachistoscope, rate accelerator, and
ntrolled reader are available for increasing speed of comprehension.
Fees—The fee for individual diagnosis is $125; for individual instruc-
n, $15 a lesson; for semi-individual instruction, $11 a lesson; for in-
uction in small groups, secondary level, $250 for 15 two-hour lessons.
ading classes (15 two-hour sessions) are offered for adults, $225; for
ll-time George Washington University students and alumni, $90. Full-
ne staff employees may contact the Center regarding special fees. All
es are payable in advance at the Reading Center.
Reading instruction is required for first-year undergraduate students
th insufficient reading skills who are taking English 9.

TERANS BENEFITS

e Veterans Counselor in the Office of the Registrar, Rice Hall, 2121
St., N.W., assists students entitled to educational benefits as veterans,
lows, or children of deceased or totally disabled veterans with any
blems which may arise concerning their benefits. This Office also proc-
es certification of enrollment and attendance to the Veterans Adminis-
ion so that educational allowances will be paid.
When feasible, students entitled to benefits as veterans or dependents
eterans should consult with the veterans counselor prior to submitting
ication to the Veterans Administration. All such students should ob-
the instruction sheet issued by the veterans counselor in the Office
ne Registrar, which sets forth requirements to be fulfilled before cer-
tion of enrollment can be made to the Veterans Administration, and
h includes other information of general interest.
e Veterans Administration is at 941 N. Capitol St., N.E., Washington,
20421.

R FURTHER INFORMATION"

tor Lois G. Goldberg

Further Information" is a student-operated undergraduate academic
rce center. It is located on the third floor of the Library, by the
, in rooms 306/307. "For Further Information" serves undergraduates
clearinghouse for academic information and as a center for peer ad-
. The center is staffed by undergraduates who provide assistance
dents seeking guidance on matters ranging from schedule planning
ourse selection to study skills.
ing fall and spring registration, peer advisors are also available
first floor of Monroe Hall to offer new and returning students in-
al academic advising and registration assistance.

CENTER FOR ACADEMIC AND ADMINISTRATIVE COMPUTING

Director F. William Rambo

The Center for Academic and Administrative Computing is located on third floor of Lisner Hall, 2023 G St., N.W. The computer and other op tional supportive services are located on the first floor of Stuart 2013 G St., N.W. These facilities normally are available 24 hours a seven days a week, to all qualified faculty, staff, and students.

The Center provides computational facilities, conducts seminars, sults with users and provides operational assistance as required. Center operates an IBM 370/148 (OS VS1) central processing unit a PDP 11 minicomputer which provides terminal and card remote-job- (RJE) to the 370 148 for students. There is a full range of compilers application software packages.

Computer programming courses are offered by the School of Go ment and Business Administration, the Department of Statistics, an School of Engineering and Applied Science. In addition, many other partments offer courses that utilize the computer as a research adjun course work.

CONTINUING EDUCATION FOR WOMEN

Continuing Education for Women Center, Suite 621-24, University Lib offers individual and group counseling services as well as credit and credit courses and career training programs. Brochures are available

GENERAL ALUMNI ASSOCIATION

The objectives of this association are to unite the graduates who w associate themselves for charitable, educational, literary, and sc purposes, and to promote the general welfare of the University.

Eligible members are those who have enrolled in any school University and who have left the University in good standing, person who is or has been a member of the teaching, research, or ad trative staff of the University, or of the Board of Trustees of th versity. Active members are those who are life members of the Washington University General Alumni Association or the Alum sociation of any school of the University, or are current contribu the George Washington University Fund.

All alumni are urged to keep the Alumni Office informed of c of address or occupation and to supply information with regard to fellow alumni. The Office is located in Alumni House, 714 21st St. George Washington University, Washington, D.C. 20052.

NGLISH FOR INTERNATIONAL STUDENTS

rector G.R. Bozzini

is is a comprehensive program in English as a foreign language, de-
ned to serve members of Washington's international community wish-
either to enroll in University credit programs or to improve their com-
nd of English through a semi-intensive study program. In general,
dents must have completed the equivalent of an American college pre-
atory high school education.

Courses are offered at various levels of proficiency covering both oral
written communication and are scheduled in 14-week sessions during
fall and spring semesters and for eight weeks during the summer.
dents entering the program will take a battery of tests to determine
r levels of proficiency for placement in English and academic pro-
ns. Registration for the tests is held in advance at the Office of English
International Students, Park Lane Building, Suite 317, 2025 Eye St.,
., Washington, D.C. 20052. A $10 testing fee, payable in advance, is
ged each student.
rsons writing from outside the United States and needing a student
will be considered for I-20 certificate of eligibility for student visa
dation. Those interested in applying for a degree program should see
s 25-27 for additional information.

UDENT LIFE

President for Student Affairs William Smith, Jr.
ant to the Vice President for Student Affairs John Perkins

ffice of the Vice President for Student Affairs develops student life
es, policies and procedures to complement the University's formal
ction program. These activities are implemented through the offices
Cloyd Heck Marvin Center, Counseling Center, Dean of Students,
ional Opportunity Program, Housing, International Students, Stu-
ctivities, Student and Alumni Career Services, and Student Health
e.

E OF THE DEAN OF STUDENTS

f Students Gail Short Hanson
nt Dean of Students Cheryl Beil
ator, Services for Handicapped Students Kathleen Christensen

ice of the Dean of Students provides counseling and information

for students, and assists in program development for the Division of
dent Affairs. The coordinator for Services for Handicapped Students w
to assure that the special services necessary for handicapped stud
to participate fully in their academic programs are provided for
through University or community resources. Staff members are
informed on University policies and the various student services prov
on campus, enabling them to provide referrals and answers to
questions concerning general student life. Personal letters of recomme
tion for students applying to graduate and professional schools ca
obtained from this office. The Dean of Students works with the Adv
to International Students, the Director of the Counseling Center, the
rector of the Educational Opportunity Program, the Director of the
dent Health Service, and the Director of the Student and Alumni Ca
Services Office in the implementation of their programs.

Counseling Center

Director E. Lakin Phillips
Assistant Director David Celio

The Counseling Center works to enable students to overcome obst
which hamper learning. The Center's services are offered to students
staff, and include (1) resolution of the individual's educational, vocati
or personal conflicts through short-term individual or group counse
vocational testing, or study skills remediation; (2) training of gra
students, resident assistants, and paraprofessionals; (3) consultin
mental health topics; and (4) development of new methods and prog
to aid student growth, such as counseling through written communica
videotaped counselor skills training, and interpersonal skills works

The Center administers the Miller Analogies Test, admissions te
and special assessments for business and industry. Through its Offic
Community Services, the Counseling Center also provides vocational
seling and educational programs to the greater Washington communi

Students may request a cost-free interview from 9 a.m. to 4:30
Monday through Thursday, and from 1 to 4:30 p.m. on Fridays.
student decides to continue, a fee of $5 for full-time students ($15 for
time students) per appointment will be charged for short-term trea
If a test battery is called for, an additional $12 materials fee w
charged. However, if financial need is a factor, fee adjustments c
made.

The Counseling Center is located at 718 21st St., N.W.

International Student Advising Office

Director Patricia McMillen
Assistant Director Robert Locke

Located in the International House at 2129 G St., N.W., the staff
International Student Advising Office provides advising and counsel
matters of personal and academic concern and visa regulations. This
is also a consultation, information, and resource center for the Univer
international population.

ational Opportunity Program

tor Ronald Whitmore
selor Marquita Green

Educational Opportunity Program is designed to provide selected Dis- of Columbia high school graduates and other qualified District resi- with financial and personal support as well as academic assistance to students pursue degree work at George Washington University. The ram Office is located at 2127 G Street, N.W.

ent and Alumni Career Services Office

tor Gordon Gray
tant Director Cynthia Gurne
selor Paula Hoffman

Career Services Office provides career guidance and placement to GW nts and alumni. Some of the specific services are: full-time and part- job vacancy lists, career counseling, programs on job-seeking skills, library of literature on occupations and employers, and current in- tion on government employment including testing dates and applica- orms. Seniors and alumni may also use the office to establish cre- l files for application to graduate schools and for employment. The is open from 9 a.m. to 5 p.m. Monday through Friday, with evening scheduled during each semester. It is located at Woodhull House, G St., N.W.

nt Health Service

or Naomi Schaub, M.D.

tudent Health Service is an outpatient clinic located in the H. B. Memorial Building at 935 22nd St., N.W.

icians and physician assistants are available by appointment from to 4:45 p.m., Monday through Friday. In addition, physician as- s are available for primary care to walk-in patients Monday through from 5 to 6:45 p.m., on Saturday from 9 a.m. to noon, and on Sun- m 10 a.m. to noon.

serious emergencies occurring during hours when the Student Service is closed students may go to the Emergency Room of the ity Hospital for treatment. This arrangement is for emergency ly, and all fees are the responsibility of the student.

nts must be currently enrolled on campus in the University to treatment at the Student Health Service. Students who so desire gage physicians and nurses of their own choice, but these students esponsible for all fees charged. The bills incurred from all services l outside of the Student Health Service (for example, x-ray work, ry work, and referrals to specialists or other outside physicians) responsibility of the student.

AND ACCIDENT INSURANCE

dent Health Service has arranged for and endorsed group health

and accident insurance, on an elective basis, for those students not have other coverage. Interested students should contact the Health Service office.

HOUSING

Director of Housing Ann Webster
Associate Director John Bohen
Assistant Directors Marilyn Mundy, Clay Nelson

Complete information concerning the University's residence halls able from the Director of Housing, George Washington University, ington, D.C. 20052. Information concerning off-campus housing University also may be obtained at this Office.

Admission to the University does not include a room reservat student will receive, with the notification of acceptance, Univers dence hall information, an application for residence hall space declaration of intent to attend the University. The application dence hall space must be accompanied by a $100 *nonrefundable* The housing deposit is credited toward the first semester's room Rooms are leased for the academic year, and lease payment made by June 16 for the fall semester.

1978-79 Residence Hall Rates Per Person for Two Semesters*

For Men:

Calhoun Hall
- double room .....
- triple room .....

For Women:

Strong Hall
- single room .....
- double room .....
- triple room .....

For Men and Women:

Crawford Hall (limited to sophomores, juniors, and seniors)—
- double room .....

Francis Scott Key Hall (limited to juniors and seniors):
- apartment for two persons .....
- apartment for three persons .....

Mitchell Hall (limited to sophomores, juniors, and seniors)—
- single room .....

Madison Hall
- double room .....
- triple room .....

* Residence hall prices and allocation subject to change.

rston Hall

double room, triple room, large room for four 1,216
suite for six, small room for four 1,134

l Service

dent freshmen and sophomores are required to participate in the food ice plan. Freshmen must participate in the seven-day, 19 meals per k plan, at the rate of $860* for the academic year. Sophomores may either the 19-meal plan or an any 14 meals per week plan for $810* for academic year. Each plan, plus an additional "any 10 meals" per week at $680* for the academic year, is optional for junior, senior, and uate students. Food service payment does not cover University inter- ion or vacation periods. All meal cards admit bearer to dining rooms in rston and Mitchell Halls and to the second-floor contract dining room he Cloyd Heck Marvin Center. Meal cards may also be used on a equivalency basis in the Marvin Center first-floor cafeteria and Rath- er.

udents who observe the Jewish dietary laws can write to make ar- ements with the George Washington University Housing Office re- ng the B'nai B'rith Hillel Foundation Kosher Meal Plan.

son Hall Apartments

son Hall is a University owned and operated apartment house con- ng 15 one-bedroom and 54 efficiency apartments. Full-time graduate narried students are eligible to reside in Munson Hall. Those wishing ply for an apartment should contact the Housing Office for a waiting pplication. All leases are for 12 months.

n and Guthridge Apartments

apartment houses are University-owned, commercially operated ngs within the campus area. Each building contains efficiency and edroom units which are rented only to full-time graduate students on s available" basis. Referrals to the resident managers of these build- are made by the Director of Housing when notice is received of cies. Leases are executed with the respective management companies re on a month-to-month basis.

D HECK MARVIN CENTER

or Boris Bell

ant Director Donald Cotter

loyd Heck Marvin Center serves as the campus community center, ing services, conveniences, and recreational and social opportunities dents, faculty, staff, alumni, and guests. Its wide range of facilities es the setting for a variety of programs conducted by the University m Board; by the departments of drama, dance, and music; and by tudent and faculty organizations.

Center Governing Board, representative of all segments of the Uni-

rvice prices subject to change.

versity community, plays an important role in the day-to-day fu of the Center. This Board works closely with the full-time sta development of procedures and policies which provide a frame the Center's operation.

STUDENT ACTIVITIES OFFICE

Director Rita Goldman
Assistant Directors Claudia Derricotte, Gary Salussolia

The Student Activities Office assists individual students and organ in program development, campus leadership development, and parti in special projects, both within the University community and t munity at large. The Office serves as a clearinghouse for activitie mation, registers and advises student organizations, and informs t versity community of activities and programs through monthly and publications. The Student Activities Office is also responsible for nating the orientation program for new students, and for planning mental development programs for graduate and undergraduate st Students who want to participate in the extracurricular phases of l sity life should acquaint themselves with the facilities and staff Student Activities Office.

UNIVERSITY COMMITTEES AND ORGANIZATIONS

Student involvement is a motivating force in the governance of t versity through the committee structure. This involvement has develop policies and programs beneficial to the student population the total University community. The numerous committees on wh dents may serve are described in the *Student Handbook*, which is a in the Student Activities Office.

Student Government

The George Washington University Student Association (GWU comprised of all full-time and part-time graduate, professional, and graduate students who are registered for academic credit on cam body of elected and appointed individuals is responsible for repre the interests of students at the University. Further information obtained from the Student Government offices in the Marvin Ce

Student Organizations

Students are encouraged to become involved with existing stud ganizations or to initiate their own. The *Student Handbook*, avail the Student Activities Office, lists approximately 150 organizations the following categories: Academic; Professional; Honorary; Interna Cultural; Political Interest; Service; Special Interest; Sports, Hobb Recreation; Religious and Meditative; and Social Fraternities and ties. More complete information about these organizations can be o through the Student Activities Office.

GIOUS LIFE

University recognizes the contribution that religion makes to the life
students and encourages them to participate in the various religious
nizations of their own choice. Catholic, Jewish, and Protestant bodies
sor various groups and form a link between the University and the
ous community. The advisers of the religious organizations are avail-
for counseling.
ligious services in various traditions are provided regularly for the
ersity community as announced.

OR PROGRAM EVENTS

t Exhibits—The work of locally, nationally, and internationally known
ts is shown in monthly exhibits in the Dimock Gallery in Lisner Audi-
m and in the art gallery of the Cloyd Heck Marvin Center. With the
eration of the Curator of Art, an annual student art exhibit is pre-
ed.

ncert Series—The Department of Music presents a series of concerts
ring faculty, guest, and student artists throughout each year.
nce—The GWU Dance Company presents major concerts, informal
o performances, experimental events, television appearances, and
re-demonstrations. Students may audition to become company mem-
and have the opportunity to choreograph, perform, and gain experi-
in the technical aspects of dance productions.
ernational Programs—The International Student Society presents an
al International Dinner in cooperation with foreign embassies and
national restaurants. Other programs include regular forums and
ers on international topics.
chestra and Chorus Concert Series—The University Orchestra and
s are two facets of the lively arts available to students either as
courses or as extracurricular activities. The Chorus presents major
rmances to the University community three or four times a year, in-
g regular winter and spring concerts. The University Orchestra pre-
several performances annually.
gram Board Series—The University Program Board regularly spon-
ocial activities, films, lectures, and special events.
reation Program—The new Charles E. Smith Center for Physical
tion and Athletics offers many facilities for student use. The Univer-
ecreation Association and the Department of Human Kinetics and
e Studies arrange a wide variety of sports and recreational activities
ecial events for all students.
ater—The University Theater produces four or five major plays and
ls during the year on the proscenium thrust stage in the Dorothy
Marvin Theatre or in Lisner Auditorium. Additional works, including
l and experimental plays, are produced in a more intimate studio
. Students have the opportunity to participate in all aspects of
and may receive credit toward their B.A. or M.F.A. degrees for
f their production work.

ATHLETICS AND INTRAMURAL SPORTS

The University is a member of the National Collegiate Athletic A
tion, the Eastern College Athletic Conference, the Association for
collegiate Athletics for Women and the Eastern Association of
collegiate Athletics for Women. Its teams participate against
universities throughout the Midwest and Eastern Seaboard. The in
legiate programs for men and women offer such sports as bask
baseball, soccer, tennis, golf, wrestling, crew, swimming and
squash, badminton, volleyball, and gymnastics.

The University offers a broad program of intramural sports act
for both men and women.

COLUMBIAN COLLEGE OF ARTS AND SCIENCES

Dean C.D. Linton
Assistant Deans B.J. Dunham, J.L. Métivier, Jr., R.C. Rutledge, H.E. Yeide, Jr.

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Bright, A.D. Britt, R.G. Brown, J.F. Burks, W.E. Caldwell, E.A. C
G.V. Carroll, I.H. Cisin, A.G. Coates, J. Cornfield, T.F. Courtless, Jr.
Davison, L.G. DePauw, R.M. Dunn, Jr., J. Eisenstein, N. Filipescu
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Mazzeo, M.L. Meltzer, J.L. Métivier, Jr., J. Miller, C.C. Mondale

* The President of the University, the Vice President for Academic Affairs, the Registrar, the University, the Director of Admissions of the University, and the University Librarian are ex officio members of the Faculty of Columbian College of Arts and Sciences.

organ, Jr., J.N. Mosél, C.A. Mozer, D. Nelson, B. Nimer, R. Parris, T.P. rros, E.L. Phillips, F. Prats, R.E. Purcell, J.P. Reesing, Jr., B. Reich, M. Reynolds, C.E. Rice, J.W. Robb, H.M. Sachar, B.M. Sapin, S.O. hiff, R.H. Schlagel, W.E. Schmidt, L.G. Schwoerer, R.P. Sharkey, L. aw *(Research)*, C. Shih, R.H. Shumway, F.R. Siegel, D.E. Silber, N.D. ngpurwalla *(Research)*, H. Solomon, C. Steiner, G. Steiner, R.W. ephens, C.T. Stewart, Jr., G.W. Stone *(Visiting)*, T. Suranyi-Unger, Jr. esearch), C. Taam, G. Teleki *(Emeritus)*, D.H. Teller, K. Thoenelt, R.B. ompson, R. Thornton, C.M. Turnbull *(Visiting)*, R.C. Vincent, R.D. alk, R.H. Walker, Jr., D. Wallace, Jr., R.A. Wallace, E.R. Weismiller, G. White, R.E. Wood, H.B. Yacobson, H.E. Yeide, Jr., A.J. Zuchelli

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Zwick
Instructors T.A. Farrand, B.K. Netland

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1979: R.L. Cole, A.M. Yezer
1980: R. L. Combs, R. K. Packer

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* The Dean of Columbian College is an *ex officio* member of all committees.
† Elected by the Faculty to serve through the designated year.
‡ Elected by the Faculty

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ncil of Arts and Sciences*

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RODUCTION

e its founding in 1821, Columbian College of Arts and Sciences, the al arts college of the University, has continued to expand and develop the city of Washington. Its central situation makes participation in ife of the nation's capital convenient for resident students. The cos-litan nature of the student body reflects the atmosphere of a great l capital. Because the students come from the 50 states and from reign countries, class discussions and casual student conversations nriched by a challenging variety of viewpoints.

e Columbian College program is a contemporary application of the ic liberal arts tradition. Its purpose is to enable the student to de- both particular abilities and general awareness as a human being. mands of the student a thorough acquaintance with one major area rning and at the same time an understanding of how that specializa- its into the larger context of the scientific, social, and moral problems

Council serves both Columbian College of Arts and Sciences and the Graduate School of d Sciences. The President of the University, the Vice President for Academic Affairs, the f Columbian College of Arts and Sciences, and the Dean of the Graduate School of Arts ences are ex officio members of the Council

which confront modern society. It stresses a broadly enlighten spective which encourages its graduates to grow through the ability and wisdom.

Throughout its history, the College has kept pace with, and o movements of reform in higher education. Sensitive to the rapidly ing patterns of student and social needs, notably the increasing and knowledge of the modern incoming freshman, the College augurated sweeping changes in its academic programs. In brief s the changes are designed to (1) permit the able student to earn th laureate degree in less than the standard four years, either by credit through a wide variety of examinations or by performi excellence within a 90-semester-hour three-year program; (2) prov student with a greater opportunity to design an individual acade gram by eliminating almost all specific course requirements exce major field; (3) encourage an early and close association between dent and individual faculty members in the field of the studen interest; and (4) foster a spirit of community and shared respo between faculty and student.

Opportunities exist for double majors within the College; in plinary programs; and, in the case of the student who finds no major or program suitable to individual educational goals, spec disciplinary programs which may be developed by the student sultation with departmental advisors and with the final approv Committee on Programs.

Columbian College offers programs leading to the degrees of In Arts, Bachelor of Arts, and Bachelor of Science; prelegal medical programs; and the first two years of the professional in public and international affairs.

Columbian College has degree-granting authority over certain which combine on-campus and off-campus courses, including the of Science degrees in Geodesy, Cartographic Science, and Ocea As most of the courses in the first two years of these programs a on campus, students may be admitted as full-time on-campus st Columbian College. After the first 64 hours, most of the courses a at off-campus locations. Students are then required to register course work with the College of General Studies, which admini campus programs. Students attending off-campus classes are e provide their own transportation to and from class. Distances vary from two to 20 miles from the campus area. Columbian Co has degree-granting authority over two other programs which a offered off campus and administered by the College of Genera Associate in Arts in General Studies and Bachelor of Gener (areas of concentration in economics, history, law enforcemen matics, political science, psychology, and sociology). For further tion on all these programs, see the *College of General Studies*

ENTRANCE REQUIREMENTS

Good character and an academic background appropriate for th of studies contemplated are required.

irements for admission to the freshman class are as follows:

n acceptable certificate of graduation from an accredited secondary showing at least 15 units* which must include four years of Eng- least two years of one foreign language; two years of science, bly with laboratory instruction; two years of social studies, one of must be American history; and two years of college preparatory natics.

he principal's statement that the applicant is prepared to undertake work.

ollege Entrance Examination Board scores submitted on the Scho- Aptitude Test and the English Composition Achievement Test.

recommended that the examinations be taken in December or y. Scores on tests taken in the junior year may be submitted. Ar- ents for tests are the responsibility of the applicant and should be vith the Educational Testing Service, Princeton, N.J. 08540; or 1947 Street, Berkeley, Calif. 94704, not less than one month before the the test. In applying for the test, the applicant should specify that res be sent to the Office of Admissions, George Washington Uni- Washington, D.C. 20052.

College Entrance Examination Board tests are preferred; however, erican College Testing battery scores will be accepted. The appli- ould request that these scores be sent to the Office of Admissions from the American College Testing Program, Iowa City, Iowa. It nmended that the applicant take the tests in October of the senior

e Committee on Admission and Advanced Standing will consider quacy of the qualifications of an applicant who, because of unusual tances, does not present all of the formal requirements stated on 8–69. The Committee may prescribe appropriate scholastic-aptitude the University. Students admitted with deficiencies in secondary units will be required to begin removing such deficiencies within year, by appropriate courses or examinations.

ATIONS

ons regarding admission, registration, fees and finances are stated s 20–34; other University regulations, on pages 45–53.

ARSHIP REQUIREMENTS

IC WORK LOAD

urage academic performance of high quality, the student's work imited.

-time student not on probation may take a course load of as much nester hours. A student employed more than 20 hours a week who n probation may take not more than 10 hours.

nount of work taken by a student on probation may be limited ommittee on Scholarship.

represents a year's study in a secondary school subject, including in the aggregate an 120 sixty-minute periods of the equivalent of prepared classroom work

A full-time student who, during the immediately preceding sem received no grades below *B* and has earned grades of *A* in thre totaling at least nine semester hours may take 18 or 19 hours. An student who, during the immediately preceding semester, has re grades below *B* and has earned grades of *A* in two courses totalin six semester hours may take 12 hours.

A student who accepts employment after registration or at during a semester must report that fact immediately to the dea the academic program may be adjusted, if necessary.

ATTENDANCE

The student is held responsible for all the work of the course registered, and all absences must be excused by the instructor before provision is made for the student to make up work miss

ADDING AND DROPPING COURSES

After registering, a student may add or drop courses only by me official "drop-add" form available in the Office of Columbian Failure to do so may result in a failing grade. The deadline for course during the regular fall or spring semesters is the end of week of classes. However, if the student presents a note fro structor explaining the special circumstances, and granting perm course may be added up to the end of the second week of classes.

The deadline for dropping a course without academic penalty of the fourth week of classes in the fall and spring semesters. T line for complete withdrawal from all courses without academic is the end of the ninth week of classes. After the deadlines, changes require that the student present a petition to the Dean's C

USE OF CORRECT ENGLISH

The use of correct English, oral and written, is required in all Any student whose English in any course whatever is deemed factory may be reported by the instructor to the dean and to mittee on the Use of Correct English. The chairman of the Comm assign supplementary work, without academic credit, varying with the needs of the student. If the work prescribed is equiv course, the regular tuition fee is charged. The granting of a de be delayed by failure to make up any such deficiency in Engli satisfaction of the Committee and the Dean.

DEAN'S LIST

The name of every student who takes a minimum of 15 seme (none of which may be in credit no credit courses) in any one who receives grades of *A* in at least 60 per cent of the course wo in that semester, and who has no grades below *B* for that se placed on the Dean's List for that semester.

EMIC STANDING

dent who is not suspended or on probation is considered to be in standing.

following rules governing probation and suspension are applicable ted to students enrolled for a full-time program (12 semester hours re) during the fall or spring semester. Students enrolled for less than ester hours during the fall or spring semester and students enrolled the summer sessions are subject to probation or suspension on the of their record for four courses (three or more semester hours of each), or multiples thereof, rather than on their record in any one ter.

bation—A student who in one semester receives two grades of *F* in s carrying three or more semester hours of credit each, or the lent, is placed on probation. A student in the first semester on ion who receives one grade of *F* in such a course will be continued bation for a second semester. Two grades of *D* will be treated as lent to one grade of *F* in determining probation. Any grades of *D* or acing earlier grades of *I* will be considered a part of the record for nester during which the *I* is removed. A student on probation taking more semester hours whose grades are all *C* or better is removed robation.

pension—The following cases constitute grounds for suspension: ee grades of *F* in courses carrying three or more semester hours dit, or the equivalent, in one semester; (2) two grades of *F* in such s in the first semester on probation; (3) one grade of *F* in such s in any later semester on probation. Two grades of *D* will be as equivalent to one grade of *F* in determining suspension. Any of *D* or *F* replacing earlier grades of *I* will be considered a part of ord for the semester during which the *I* is removed.

minimum period of academic suspension is one fall or one spring er. Final dates for applying for readmission are the same as those ing undergraduate admission (see page 20). A suspended student readmission must submit evidence to the Committee on Admis- nd Advanced Standing of conduct during absence from the Uni- which indicates that the student will profit from readmission. A suspended twice for poor scholarship will not be readmitted.

Semester Warning—When, at the end of the sixth week of each er, instructors file in the Office of the Dean the names of freshman phomore students who are doing unsatisfactory work, a notice of is sent to the student and a copy filed with the appropriate ad- warning constitutes notice to the student to consult the instructor visor at the earliest opportunity.

LETE/AUTHORIZED WITHDRAWAL

ons under which the grades of *I* (Incomplete) or *W* (Authorized wal) may be assigned are described on pages 46–47.

ving an Incomplete—The grade of *I* must be removed no later than day of the examination period for the fall or spring semester im- y following the semester or summer session in which the grade of

I is assigned. An "Incomplete" that is not removed within this
automatically changed to an *F*. In cases of well-documented ex
circumstances, an instructor and a student may jointly petition
or the appropriate committee, for additional time in which to com
work of the course. Such petitions should be submitted within
period. The grade of *I* cannot be removed by reregistering for th
here, or by taking its equivalent elsewhere.

CORRESPONDENCE AND HOME-STUDY COURSES

No credit is given for work done by correspondence or in ho
courses.

CLASSIFICATION OF STUDENTS

A *freshman* is a student who has completed less than 30 semes
A student becomes a *sophomore* upon completion of 30 semester
student becomes a *junior* upon completion of 60 semester hours.
becomes a *senior* upon completion of 90 semester hours.

An *unclassified* student is one who is not a candidate for a
degree (normally because the student already holds one), but wh
for valid academic reason to take a limited program for a lim
Registration in this status is permitted only with the prior appro
appropriate Dean's Council.

SOPHOMORE YEAR IN PARIS PROGRAM

Freshmen who have received grades of *C* or higher in all co
during the first semester may be eligible to participate in th
Washington University-American College in Paris Sophomore
gram. Qualified students will be encouraged to accept this o
to profit from the cultural and intellectual riches of Europe
ing their second year living and studying in Paris. Credits
this program will be transferrable toward a degree in Columbia
of Arts and Sciences. Since all courses are taught in English, a
of French is not mandatory, but is desirable.

ADVISORY SYSTEM

Each student is provided with both academic advising and pers
seling. *Academic* advising is performed by members of the facul
for their knowledge of academic programs, and each student, be
tration, makes up a program in consultation with the advisor
student who has *not* selected a major field receives academ
from a member of the Columbian College Committee on Stude
(see page 66). A student who has officially declared a major fie
academic advising from the appropriate department, or fro
departmental committee. *Personal* counseling is available th

e of the Dean of Students or through the University Counseling Center.
tudents are encouraged to maintain close contact with their advisors.
dents who intend to transfer after the sophomore year to the School
blic and International Affairs are assigned special advisors to assist
in planning their programs.
academic warning system permits early attention to students whose
falls below required standards. In such cases, students are asked
nsult regularly with their advisors. On request, and with the student's
ission, copies of academic warnings or probation notices may be sent
rents or guardians, who are themselves welcome to meet with mem-
of the advisory staff.

EMIC ADVISING CENTERS

department has set up Academic Advising Centers where both gen-
educational counseling and specific major-field advising are available
dents. The locations and hours of these Centers may be obtained
departmental offices.
the freshman student deliberates choice of a major, he or she should
lt with faculty advisors in as many of these Centers as he or she
s. Once a major is officially declared, the student then receives all
mic counseling from the Academic Advising Center of the major
tment.

ADVISING

advising has recently become an additional component of the
mic advising system in Columbian College. During fall and spring
ation, undergraduate peer advisors are available on the first floor
nroe Hall to offer scheduling help and course selection advice to
students.
ing non-registration periods the peer advisors operate an academic
ce center, "For Further Information," which is located in rooms
07 of the Library. "For Further Information" acts as both a clearing-
for academic information and as a center for peer advising.

ARATION OF MAJOR

udent is encouraged to select and officially declare a major field
normally no later than the end of the freshman year. All students,
er, whether they are entering freshmen or transfer students, must
the advisor's signature on a proper form, and return the form to
ice of Columbian College in order to declare a major. No student is
ered to have a major until this process is completed. Thereafter, the
t receives academic guidance from a faculty advisor in the major-
epartment.

COLUMBIAN COLLEGE GENERAL COURSE REQUIREMENTS

All candidates for the degree of Bachelor of Arts or Bachelor of S are admitted to a general arts and sciences curriculum until they c a major field. Except for two general course requirements, all curr requirements leading to the degrees of Bachelor of Arts and Bach Science are established by the various major field departments grams.

The two general requirements are the following:

1. Each student must, during the freshman year, demonstrate a achievement in English Composition, either by examination or by Engl 9 or 10, and Engl 11 or 12. This requirement may not be pos

2. Each student at some point in the college career must unde meaningful initiation into the three divisions of knowledge: hum natural and mathematical sciences, and social studies. As each ma will normally represent one of these three areas, the requirement fulfilled by taking no less than six semester hours in each of the o areas. These six credits may be in approved introductory cou in approved advanced courses if the student is qualified and rec instructor's permission. Applied and tool courses do not satisfy quirement for meaningful initiation into the Humanities. All courses taken in fulfillment of the meaningful initiation requirem include laboratory instruction. Normally, these six-hour units taken in a single subject or department. Courses simply waived (assigned) cannot satisfy the meaningful initiation requirements.

It is recommended that courses taken to satisfy the meaningful requirement be selected from the following:

Humanities

Art 31-32, 71-72; Classical languages 71, 72, 108, 113; Chinese 163-16 51-52, 61-62, 71-72, 191-192; French 51-52; German 51-52, 103-104. Philosophy 50 and 71, 111, 112, 113, 131, 132, 162, or 172; Religion 21-22, or 23 and 9; Slavic languages 71, 91-92; Spanish 51-52; Speech a 45, 49, 133, 143, 144, 165, 166, 192, any combination of two upper-level a or music history courses; any combination of two upper-level phil religion courses; any combination of any two Chinese, English, French Russian, or Spanish literature courses.

Natural and Mathematical Sciences

Biology 3-4, 11-12; Chemistry 3-4, 11-12; Geology 1-2, or 5 and 2; Ma 31-32, 32-33, 41-42, 51-52, 53-54, 9-10, or any combination of two math courses; Physics 1-2, 9-10; Statistics 51 and 97 or 103, 53 and 9 and 97, or 111-112.

Social Studies

American Civilization 71-72; Anthropology 1-2; Economics 1-2; 51 52; History 71-72, 39-40, 72 and 91, 40 and 91; Journalism 71-72, 11 Political Science 1-2; Psychology 1 and 5, 6, 8, 22, or 29; Sociology 1-2

llowing courses will not satisfy the meaningful initiation requirement:
ed courses in art (also Art 1); music, and speech and drama (Spl)r 1
11)
composition courses
freshman and sophomore) foreign language courses
matics 3, 6, 30

red Placement Examinations

lish—Students whose College Board English Composition Achieve-
Test scores suggest that they will benefit from more intensive training
npositional skills may be assigned to Engl 9 or may be tested in
ulary, spelling, grammar, standard usage, and writing skill before
nent in either Engl 9 or 10. Students whose scores indicate superior
tence will be allowed to waive the Engl 10 requirement. Those whose
indicate markedly superior competence will be allowed to waive
Engl 10 and Engl 11 or 12.
ign Languages—A student who has not been granted advanced
ng and who wishes to continue in college the language begun in high
must take a placement examination in one of the following: Chi-
French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish.
completion of the examination, assignment is made to the appropriate
.
nematics—New students accepted for registration in Math 30, 31, or
required, prior to registration, to take a placement examination in
and trigonometry; those accepted for registration in Math 51 are
ed, prior to registration, to take a placement examination in algebra.

n Language Requirement

t major programs requiring foreign languages a student must com-
atisfactorily the equivalent of two years of college work in a single
language.
dent offering for admission four acceptable high school units of a
foreign language, or the equivalent, is not required to take any
language.
udent who offers less than four units and wishes to continue the
nguage must take the language placement test.
any instances foreign languages are required or recommended as
tion for advanced work. The student should consult the advisor
appropriate foreign languages may be included, when necessary, in
dent's program.

nd Second-Group Courses

oup courses, those numbered from 1 to 100, are intended primarily
hmen and sophomores. Second-group courses, those numbered
1 to 200, are intended for juniors and seniors. However, a qualified
n or sophomore may, with the permission of the advisor and of
artment concerned, take second-group courses. Such qualification
ved by passing or waiving introductory courses or prerequisite
in the first group.

Courses in the Major Field or Department

Every student is given the opportunity of taking a wide range o arts subjects—humanities, natural and mathematical sciences, soci ies—both as a means of laying the groundwork for more conc major-field study and as a means of determining what academic best adapted to the student's interests and aptitudes. In order to this opportunity and to avoid over-specialization once a major h selected, at least 60 hours of course work, including the genera requirements of Columbian College, must be taken outside the m department or major program. (This does not apply to students i hour degree program.)

Professional Courses

Except for majors in applied mathematics and for students inte apply for the combined degree of Bachelor of Arts and Doctor cine, no more than 12 hours of professional courses, e.g., courses o units of the University other than Columbian College, may be in the hours required for the bachelor's degrees in Columbian Students electing professional courses under this rule must o approval of the dean before registration.

Experimental Humanities/Service-Learning Program

A maximum of 21 semester hours in any combination of Exp Humanities courses and Service-Learning Program courses may b toward bachelor's degrees in Columbian College.

Earning Credit By Examination

Assuming there is no duplication of coursework earned, a ma 30 semester hours of credit may be assigned for any combinati following:

College Entrance Examination Board Advanced Placement Tes may be granted for college-level courses taken in an approved s school if substantiated by satisfactory performance on the Placement Tests. See pages 23–24 for further details.

College Entrance Examination Board College-Level Examina gram (CLEP)—Prior to matriculation, credit may be assigned General Examinations (with the exception of the English Compo amination) passed at the 50th percentile or above. Credit may b for any CLEP Subject Examinations passed at the level recom the College Board model policy.

After matriculation, credit for CLEP Subject Examinations w assigned without special authorization by the Columbian Colleg ment governing the subject involved. See pages 22–23 for add formation.

Special Departmental Examinations—A student may request a ment of Columbian College to offer a special examination co subject matter of any specific course. (If an appropriate CLE Examination is available, the department may choose to employ

al of such a request is not automatically granted: the student must evidence of sufficient background to have a reasonable command of ubject matter. A student who has previously taken examinations to e course requirements may not subsequently take examinations for t in the same courses. Assigning credit (or waiving a requirement) by al departmental examinations will depend on the department's evalua- of the examination paper. These examinations will normally be of at three hours' duration. A fee of $25 for each course examination is ed for preparation, administration, and grading of the examination.

ing Introductory Courses by Examination

cement Tests—Many departments in Columbian College, including sh, mathematics and all foreign languages, require students to take ment tests to determine level of proficiency or eligibility for specified es. The student is placed in an appropriate course on the basis of tests. There is no charge to the student for placement tests, and no (advanced standing) is awarded for courses bypassed or waived as lt of these tests.

iver Examinations—Several departments in Columbian College, in- g English, history and sociology, offer periodic waiver examinations troductory courses. Such examinations may be attempted at the of the student; a fee of $5 is charged. Specific departments should nsulted for further details. *Passing a waiver examination does not a student to any semester hours of credit.*

g Additional Semester Hour of Credit

lly, no deviation is permitted from the number of semester hours of given in parentheses after the title of each course. In exceptional stances, however, and with the prior approval in writing of the tor and the dean, a student may register for and earn an additional ter hour of credit in certain appropriate second-group (upper- n) courses by doing a significant amount of extra work as assigned pervised by the instructor. This privilege is not applicable during the er Sessions.

OFESSIONAL REQUIREMENTS

ts who plan to major in any program offered by the School of and International Affairs are registered during the freshman and nore years in Columbian College. Requirements for the first two f these programs, as well as requirements for the premedical pro- re listed on the following pages.

dical Curriculum

nedical student who intends to work toward a bachelor's degree the general requirements of Columbian College (see pages 74–75), ay, follow the major field curricula of any Columbian College

department. Each premedical program must be approved by th
medical advisor. For admission to most medical schools the studen
have a minimum of 90 semester hours applicable towards a degre
approved college of arts and sciences; the 90 hours must include

1. *Biology:* eight semester hours. This may be either in general bio
zoology but may *not* include separately credited courses in botany.
2. *Chemistry:* eight semester hours of general inorganic chemistry
may include qualitative analysis), including four semester hours of labo
and six to eight semester hours of organic chemistry, including labora
3. *Physics:* eight semester hours, including at least two semester l
laboratory.
4. *English:* six semester hours. This may be the usual introductory
course or its equivalent.

Many medical schools have additional entrance requirements,
which are courses in biochemistry, embryology, histology, genetic
mathematics. Even where such courses are not actually required, t
strongly recommended.

With the exception of these specific requirements applicants ar
to follow their personal interests in developing their premedical
of study. A well-balanced program, rather than a specific field,
criterion by which an applicant is judged. It is not advisable
courses that appear to cover subject matter in the medical progra

While well-qualified candidates are eligible for admission afte
pleting the minimum 90 semester-hour requirement, the majority o
cants are found to be better prepared for the study of medicine aft
years of college work.

Chinese Language and Literature

The first two years in preparation for the Bachelor of Arts degree
major in Chinese Language and Literature in the School of Pub
International Affairs consists of a minimum of 60 semester hour
student must, during the freshman year, demonstrate adequate a
ment in English Composition, either by examination or by taking
or 10, and Engl 11 or 12. The student must also undertake a mea
initiation into the three divisions of knowledge: Humanities, Natu
Mathematical Sciences, and Social Studies. As the major field re
one of these three areas, the requirement may be fulfilled by ta
less than six semester hours of approved introductory courses,
semester hours in approved advanced courses if the student is
and receives the instructor's permission, in the Natural and Mathe
Sciences and in Social Studies. Students must include in their p
of study Chin 1-2, 3-4, and 9; Chin 7-8 and 9; or Chin 5-6. Chi
preferred.

East Asian Studies or International Affairs Curriculum

First two years in preparation for the Bachelor of Arts degree in
of East Asian Studies (China or Japan) or International Affairs
School of Public and International Affairs:

		Semester Hours
Engl:	Engl 9 or 10, and 11 or 12	6
Humanities or AmCv:	Art 31–32 or 71–72; *Literature (American, Chinese, East Asian, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group philosophy courses; Rel 21, 59–60; or AmCv 71–72	6
†Language:	Chinese, Japanese, French, German, Hebrew, Italian, Russian, or Spanish	12–16
th/Science:	BiSc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	6–8
cial Studies:	Econ 1–2; Hist 40 and 72; PSc 1 and 2, or 2 and 3, and 91	18
‡Elective:		6–12
	Total	60

ic Affairs Curriculum

two years in preparation for the Bachelor of Arts degree in the field ublic Affairs in the School of Public and International Affairs:

Engl:	Engl 9 or 10, and 11 or 12	6
Humanities or AmCv:	Art 31–32 or 71–72; *Literature (American, Chinese, English, French, German, Greek and Latin, Italian, Slavic, or Spanish); Mus 3, 4; first- or second-group Philosophy courses; Rel 21, 59–60; AmCv 71–72	6
Language or Statistics:	NOTE: This requirement may be satisfied by two years of one foreign language§ or 12 semester hours of Statistics. Statistics courses taken to fulfill this requirement may not also satisfy the math/science requirement below.	12
th/Science:	BiSc 3–4 or 11–12; Geol 1–2; Math 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10; or one course selected from Stat 51, 53, 91, and one course selected from Stat 97, 105, 111	6–8
ial Studies:	Econ 1–2; Hist 40 and 71–72; PSc 1 and 2, or 2 and 3	21
*Elective:		7–9
	Total	60

tudent elects six semester hours of literature in any foreign language, this cannot be used sfy the language requirement.

5-6 is required for East Asian Studies (China focus) majors; Japn 3-4 is required for East Studies (Japan focus) majors. Greek and Latin are not acceptable for International Affairs

is not given for courses elected in the Department of Human Kinetics and Leisure

and Latin are not acceptable for Public Affairs majors.

Urban Affairs Curriculum

First two years in preparation for the Bachelor of Arts degree of Urban Affairs in the School of Public and International Af

Engl:	Engl 9 or 10, and 11 or 12 .....
Humanities or AmCv:	Art 31–32 or 71–72; Literature (American, Ch English, French, German, Greek and Latin, I Slavic, or Spanish); Mus 3, 4; first- or second- Philosophy courses: Rel 21, 59–60; or AmCv 71–7
Math/Science:	BiSc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1–2; 9 and 10 or 30 and 31; Phys 1 and 2 or 9–10 ... NOTE: If a student elects two years of a foreig guage, two semesters of Statistics courses ma substituted for the Math/Science requirement.
Social Studies:	Econ 1–2, Hist 71–72, and PSc 1 and 2, or 2 and 3 Six semester hours selected from the following: Hum 40, 51–52, Soc 2 .....
*Elective:	Students may substitute some of the required co for the major (see pages 173–74) for elective co during the sophomore year .....
	Total .....

DEGREE PROGRAMS

ASSOCIATE IN ARTS DEGREE

The Associate in Arts Degree may be granted to a student who pleted 60 semester hours in arts and sciences with acceptable gr who has fulfilled the general requirements described on pages addition, the degree may be awarded to pre-public and internat fairs students upon completion of the curriculum specified for two years of the appropriate program. The last 15 semester hou program of study must be completed in residence in Columbian A student wishing to receive this degree must file an Applic Graduation and pay the $10 graduation fee at the time of regist the semester or summer session in which the requirements will pleted.

THE BACHELOR'S DEGREES

Columbian College offers programs leading to the degrees of Ba Arts and Bachelor of Science.

In cooperation with the School of Medicine and Health Sci seven-year curriculum leading to the combined degrees of Ba Arts and Doctor of Medicine is offered.

* Credit is not given for courses elected in the Department of Human Kinetics Studies

ements for the Degrees

ARSHIP

hundred and twenty hours of coursework must be passed and a -point index of 2.00 achieved in courses graded on a four-point At least 60 hours of coursework, including the general course re- ents of Columbian College, must be taken outside the major-field ment or major program.

index is obtained by dividing the number of quality points by the r of semester hours of courses passed with grades of *A*, *B*, *C*, or *D* the student submits for graduation. Both the number of quality and the number of semester hours of courses are based on the stu- record at this University. The index is computed as follows: *A*, four ; *B*, three points; *C*, two points; *D*, one point; for each semester hour the student has taken. Courses marked *F*, *W*, *I*, *NC*, or *CR* are not ered in determining the index, though courses passed with *CR* count d the 120-hour overall requirement. (When a formal grade is re- d for an Incomplete, a grade of *D* or better will be included in the tation of the index.) A grade of Incomplete which is not removed one semester is automatically changed to an *F*. Grades earned in es taken at another institution are not considered in computing the At the time of graduation, a student must be in good academic ng. See pages 85–86 for scholarship requirements applicable specifi- o departmental majors.

ENCE

the Standard 120-semester-hour Program—A minimum of 30 se- r hours, including at least 12 hours in the major field, must be com- d in residence in Columbian College. *Unless special permission is ed by the dean to pursue work elsewhere, the work of the senior must be completed in residence.* This requirement applies to students ferring within the University as well as to students transferring from **institutions.**

the 90-semester-hour Program—The last 60 semester hours, including ast 12 hours in the major field, must be completed in residence in **mbian College.**

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ner work may be counted in residence. For regulations governing nts who are absent from the University for one semester or more, Continuous Registration," page 49.

ICULUM REQUIREMENTS

nge in degree candidacy within Columbian College (e.g., from Bache- f Arts to Bachelor of Science) requires the permission of the dean. degree requirements effective at the time the change is approved be met.

st-group courses may be required as prerequisites to the major, but se of their introductory character they cannot be counted as part of programs. (See "Explanation of Course Numbers," page 196.)

CREDIT/NO CREDIT OPTION

A junior or senior student in Columbian College who is in good s may, with the approval of his advisor and the dean, take one cour mester and receive a grade of *CR*, Credit, or *NC*, No Credit. No will be allowed to take more than four credit/no credit courses un regulation. The student may, however, in addition receive grades of in the proseminar for field-of-study majors and in other courses n using such grades. A student must sign up for the credit/no credi at registration. Under no circumstances may a student chan credit/no credit status to graded status, or vice versa, after the registration. Courses required in the student's major field (cou quired in the major department or those required outside the m partment) may not be taken on the credit/no credit basis. A trans dent may not chose this option until the second semester of enroll this University.

TUTORIAL STUDY

A junior or senior of demonstrated capacity, with a special intere subject matter of a regularly listed course, may be permitted to torial study in residence under the personal direction of the in in accordance with the rules of the appropriate department and approval of the dean. Credit under this plan is limited to the semester hours of credit designated for each course in the list of of instruction. It assumes frequent and regular conferences betwe student and instructor.

THE STANDARD 120-SEMESTER-HOUR PROGRAM

One hundred and twenty semester hours of course work are req graduation. At least 60 hours of course work, including the requ stated on pages 74–75 and 81, must be taken outside the major d or program. The student should consult the advisor at each re about choice of courses.

Each student should declare a major as soon as possible, prefera completion of 30 semester hours. A student may change the m with the consent of the dean and of the department or comm cerned, and the student must meet the requirements for the n in effect at the time the change is approved.

Students transferring from other institutions or from other colleges, or divisions in this University, with major requirement or substantially met, must satisfy the residence requirement of C College (see page 81).

THE 90-SEMESTER-HOUR PROGRAM

The 90-semester-hour degree program is designed for the exce able student. This program, which leads to the regular Columbian degrees, makes it possible to graduate in three normal academ with a total of 90 semester hours of credit instead of the stand

ents in this program must complete all of the requirements for the
-year degree in the semester in which the 90th semester hour is
ved.

e requirements for this program are (1) 90 semester hours of credit
ed in college courses (that is, the 90-hour requirement may not be re-
d by credit earned through examinations); (2) completion of the chosen
r-field program and general curricular requirements; (3) grades of *A* in
ast 45 semester hours of course work and no grades below *C*; (4) at
60 semester hours of credit earned in 100-level courses; and (5) rec-
endation of the major department or program.

be eligible for this program, the student must show evidence of ex-
onal academic ability by college record, performance in college
es, and other appropriate information.

interested student should make application directly to the major-
departmental chairman or program director as soon as possible,
rably by the end of the first year of study. The student's academic
d to that point will, of course, provide a useful criterion of eligibility.

ransfer student may qualify for graduation under the 90-hour program
ded the student completes at least 60 semester hours of the approved
ur program in Columbian College, earns grades of *A* in no less
45 semester hours of such course work at this University, and has
ades below *C*.

student who fails to maintain the required academic performance
studying toward the 90-hour degree program simply continues for
andard 120-hour degree.

elor of Arts

Bachelor of Arts degree is offered in the following fields:

ican Civilization
can Literature
opology
ed Mathematics
ed Statistics
istory
y
y
stry
se Language and Literature
cal Archeology and
ropology
al Archeology and
sics
cal Humanities
tic Art
nics
n Literature
nmental Studies
rts
Language and Literature
phy
y
nic Languages and
atures
History
Journalism
Judaic Studies
Latin American Studies
Mathematical Statistics
Mathematics
Music:
  Applied Music
  Music History and Literature
  Music Theory
Philosophy
Physics
Political Science
Psychology
Religion
Russian Language and Literature
Russian Literature and Culture—in
  Translation
Sociology
Spanish American Literature
Spanish Language and Literature
Speech Communication and Broadcasting
Speech Pathology and Audiology
Statistics (Computer Science option)
Zoology

Combined Degrees of Bachelor of Arts and Doctor of Medicine

A candidate for the combined degrees of Bachelor of Arts and D
Medicine must (1) complete the entrance requirements for the D
Medicine degree in the School of Medicine and Health Sciences;
plete the general requirements stated on pages 74–75 and 81; (3)
late 90 semester hours in the liberal arts, including a minimum
second-group courses in Columbian College; (4) obtain the app
the Dean of Columbian College at the time of entering the S
Medicine and Health Sciences; (5) obtain the recommendation of
for Academic Affairs of the Medical Center at the completion o
scribed courses in the first year of the School of Medicine an
Sciences, at which time the degree of Bachelor of Arts will be
(professional work taken at another institution will not satisfy t
requirement of the combined degrees); (6) maintain throughout t
course the scholarship level required for graduation.

Bachelor of Science

The Bachelor of Science degree is offered in the following fiel

- Applied Mathematics
- Applied Statistics
- Biology
- Botany
- Chemistry
- Environmental Studies
- Geology
- Geology (Engineering option)
- Mathematical Statistics
- Mathematics
- Physics
- Zoology
- Statistics (Computer Scie option)

The Undergraduate Major

There are two types of undergraduate majors: the Field-of-Stu
and the Departmental major. Five majors—Classical Archeology
thropology, Classical Archeology and Classics, Environmenta
Judaic Studies, and Latin American Studies—although interdep
in nature, are governed by the regulations of the Departmental

FIELD-OF-STUDY MAJOR

Each Field-of-Study major covers a carefully worked out field
nated study and is under the supervision of the appropriate d
and the Columbian College Committee on Studies.

The Field-of-Study major requires no specific program of c
though the student is required to meet the over-all general req
for the degree. Ability to pass the Major Examination is assum
convincing demonstration that the student possesses the breadt
and quality of knowledge of the major usually defined in terms o
hours, courses, and grades. Information on each field is obtai
the department. Immediately upon declaring a major, students sh
sult the appropriate department so that they may be assigned a

The Field-of-Study major places special emphasis on the
development of the individual student. Programs in the same

epending upon the individual student's background, previous study, ptitudes. The student is expected to consult the advisor frequently, e special proseminars offered in some fields give the student further unity for individual advice and direction in pursuing a program lly adapted to individual needs and abilities. A close student- r relationship is essential for the student's success under the f-Study major plan.

following Field-of-Study majors are offered: American Civilization, can Literature, Chinese Language and Literature, English Literature, Language and Literature, History, Russian Language and Literature, n Literature and Culture—in Translation, Spanish American Litera- panish Language and Literature.

eminar in the Major—A proseminar is offered in most fields to help dent acquire a coordinated knowledge of the chosen field through g, study, and laboratory exercises. It is a presentation of the content ethods of the major field as a whole through the organization and nation of the knowledge obtained in the various formal courses in jor subject and of material not usually included in such courses. ourse is not required, but, if it is elected, strict attendance is essen- x semester hours, but no qualitative grade, may be assigned. When ed in this course, the student has the privilege of visiting, subject pproval of the instructor, any other appropriate course offered in llege. (Regular attendance in a course, either for credit or as an , requires registration and payment of tuition.) Proseminars are ly to the stude t who has been accepted as a candidate under that major.

Major Examination—The Major Examination will normally be taken close of the senior year: a student on a limited schedule may take it ier than one calendar year before graduation. A student who fails a Major Examination may, at the discretion of the Committee on , be re-examined at a later regular major-examination period. The ttee on Studies has general supervision of the preparation, reading, ading of Major Examinations. Major Examinations are held each r on dates fixed by the department or departments concerned, but ase later than December 1 for the fall semester, April 13 for the emester, and August 26 for the summer sessions.

MENTAL MAJORS

nental majors, unlike Field-of-Study majors, are defined in terms of ours, required courses, and the attainment of grades no lower than minimum required second-group courses taken in the major field. required course will satisfy a curricular requirement in the major, ill not count toward the minimum number of hours required in the (A department may require a degree candidate to repeat a required in which a *D* was received. See page 45.) The minimum specific ments for Departmental majors are listed below the staff of instruc- the department concerned. The chairman of the department, or ted departmental advisor, should be consulted at registration con- the student's program of courses; and the entire program, including

electives, must be approved by the department. The student
pected to consult the chairman or advisor in all matters affecti
gram of studies, such as changes, substitutions, or withdrawals,
cially concerning the student's progress in a course. A clos
advisor relationship is desirable.

Departmental majors are offered in the following: American
Anthropology, Applied Mathematics, Applied Statistics, Art H
ology, Botany, Chemistry, Classical Archeology and Anthropol
departmental), Classical Archeology and Classics (interdep
Classical Humanities, Dramatic Art, Economics, English Liter
vironmental Studies (interdepartmental), Fine Arts, Geography
Geology (engineering option), Germanic Languages and Literat
tory, Journalism, Judaic Studies (interdepartmental), Latin Amer
ies (interdepartmental), Mathematical Statistics, Mathematics, M
sic History and Literature, Music Theory, Applied Music), P
Physics, Political Science, Psychology, Religion, Russian Lan
Literature, Sociology, Speech Communication and Broadcastin
Pathology and Audiology, Statistics (computer science option),

DOUBLE MAJORS

With the prior approval of the departments concerned, a st
completes the requirements of two major fields in Columbian C
example, mathematics and physics, or English and Latin, or hi
economics) may graduate with a double major. Such a stude
consult with advisors in the two departments concerned and
declare both majors on the appropriate forms available in
office. A double major must be taken in departments offering
degree (either the B.A. or the B.S.); a major field in Columbi
cannot be combined with a major field offered by another degre
unit of the University.

INTERDISCIPLINARY PROGRAMS

Regular Interdisciplinary Programs—Several programs pres
including American Civilization, Classical Archeology and An
Classical Archeology and Classics, Environmental Studies, Juda
and Latin American Studies.

Special Interdisciplinary Programs—A student who finds
major or program suited to individual educational goals may
special major program, in consultation with appropriate depar
visors. Final approval of such a program rests with the Commi
grams. Only programs with valid and clearly defined academic
be approved, and each shall be designated by a title sugges
student to the Committee on Programs for approval. At least
hours of credit of the approved program must be completed in
College. Because of their broad scope, such interdisciplinary
not be combined with a double major.

A student in an interdisciplinary program will be expected
second semester of the senior year, to take a comprehensive

oral or written) in the interdisciplinary field, or to undertake a sen-
nprehensive thesis, at the discretion of the student's interdepart-
committee.

ial Interdisciplinary Courses—Under the supervision of the Com-
on Programs, new courses will be offered each semester combining
thods and insights of several disciplines. Interested students should
t the current *Schedule of Classes*, where they will find such courses
red 701 and 721. These courses do not satisfy the requirement of
ngful initiation into the three divisions of knowledge (see Columbian
e General Course Requirements).

DUATE SCHOOL OF ARTS AND SCIENCES

H. Solomon
ant Deans A.D. Andrews, E.A. Caress, D.A. Rowley

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y*

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RY AND ORGANIZATION

aduate School of Arts and Sciences is responsible for advanced nd research leading to Master's degrees and the degree of Doctor osophy in the arts and sciences. Graduate programs at George gton University were first formally organized under the Graduate in 1905, following several decades of gradual growth in a number rtments. In 1930 the Graduate School was discontinued. Columbian , the University's liberal arts college, then assumed responsibility Master of Arts and Master of Science degrees, and a newly created e Council administered all Doctor of Philosophy programs. Pro- l schools took responsibility for advanced degrees in the profes- ields.

67 the Graduate Council and the Graduate Division of Columbian were consolidated into a new Graduate School of Arts and s. All graduate programs in the arts and sciences leading to the of Master of Arts, Master of Arts in Special Studies, Master of ts, Master of Forensic Sciences, Master of Music, Master of Sci- laster of Science for Teachers, Master of Science in Forensic Master of Science in Special Studies, and Doctor of Philosophy r the Graduate School.

lition, a Master of Philosophy degree is awarded by the School, commendation of the appropriate department, to students who ccessfully completed the General Examination for the Doctor of hy degree.

chool is under the direction of the Graduate Faculty of Arts and . It is the responsibility of the Faculty to set the requirements for n to the School, to provide courses and programs of study and for its students, to establish academic standards for its degrees,

to recommend to the Board of Trustees the awarding of degre
down regulations as needed for the operation of the School, and
to supervise its activities.

The administration of the School is vested in the dean, who is
of the Dean's Council, which is responsible to the Faculty of th
for all policy matters.

ADMISSION REQUIREMENTS

Application forms for admission to graduate study are obtained
Office of the Dean of the Graduate School of Arts and Scienc
completed, these application forms must be submitted to this
gether with college transcripts and letters of reference, and other
tion as required by the department or program. Admission is dep
departmental recommendation and approval by the dean.

Applicants must have academic backgrounds of excellence, usu
majors, or equivalent, in the fields in which they intend to stud
vanced degrees. Normally, a *B* average (or equivalent) from an
college is required. With evidence of special promise, such as hi
ate Record Examination scores, an applicant may be accepte
academic record falls short of *B*. The minimum does not assure
acceptance. The departments may, and often do, set higher
standards. Moreover, the number of spaces available for new
students limits the number that can be accepted. Students wh
their senior year must have completed their baccalaureate w
registration in the Graduate School and must present evidenc
completion. Students whose native language is not English are
take the *Test of English as a Foreign Language* (TOEFL), admin
the Educational Testing Service, Princeton, N.J. (see pages 25-

Application for Admission—Applicants who are requesting
support must submit completed applications by February 15 (
for students in clinical psychology and art therapy) for admis
fall semester and by November 1 for admission in the spring
Applicants for the on-campus Master of Arts in Special Studies
all application materials in the Graduate School Office by July
fall semester, November 1 for the spring semester, and April
summer sessions. Applications for graduate study without fell
port made after these dates are acceptable for admission in
sponding semester and will be reviewed if time permits and
available in the program desired. More time than normal may
to process applications submitted during July and August.

Readmission—A student who has failed to maintain continu
tion and wishes to resume a graduate program must file an
form to be considered for readmission. Readmission is not
and the application is subject to review by the department c
the dean. The student may be required to take qualifying
on the course work completed. Application forms are avail
Graduate School Office.

ATIONS

ons regarding admission, registration, fees, and finances are stated
s 20-34; other University regulations, on pages 45–53.
dition, the Graduate School publishes a Student Handbook each
c year which contains updated information on the School's
regulations, and other matters of concern to enrolled or admitted
. It is the responsibility of the student to be aware of the informa-
tained in the catalogue and handbook.

or graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*,
ncomplete; *W*, Authorized Withdrawal; *CR*, Credit.
ymbol *I* (Incomplete) indicates that a satisfactory explanation has
en to the instructor for the student's failure to complete the re-
ork for a course. The "Incomplete" must be made up before the
one calendar year. An "Incomplete" which is not removed within
ndar year remains as a grade of *I* on the student's record. The
I cannot be removed by reregistering for the course here, or by
s equivalent elsewhere.
rade of *I* is also given for all thesis and dissertation research
ntil the thesis or dissertation is completed. Upon the satisfactory
on of the thesis or dissertation the grade *I* is changed to *CR*
cally. The grade of *CR* is given for an *Advanced Reading and*
(usually numbered 398) course.

hip Requirements

students are required to maintain a minimum accumulative grade
of *B* (3.00) in all course work taken following admission to the
School. Individual departments may require a higher average.
s of art history, English, history, and psychology require a 3.25
f the required grade average is at any time not maintained, the
degree candidacy is subject to termination.
case of a student who receives a grade of *F* for a course in the
of studies, the Graduate School will require a written statement
department justifying the student's continuance in the Graduate
d outlining the program to be followed. Continuation is contingent
dean's approval. When a grade of *F* is received for a course in
m of studies, the grade is included in the student's grade point
hether or not the course is repeated.
nt may repeat for credit a course in which a grade of *C* or above
ed only when permitted to do so by the department concerned,
course description states that the course may be repeated for
vritten statement to this effect must be submitted for approval to
office by the appropriate departmental advisor. It is then filed
egistrar. If a course is repeated for credit, the first grade re-
ains on the student's record.
te student may take an advanced undergraduate course (courses
101-200) for graduate credit only upon the approval of the dean
partment at the time of registration. Such approval is granted

only with the provision that the student complete additional w
to receive graduate credit.

Program of Studies

The program of studies must be approved by the dean and
mental advisor and filed in the Graduate School Office n
November 1 for graduate students entering in the fall semest
15 for graduate students entering in the spring semester. A
studies may be revised, when necessary, by obtaining the app
departmental advisor and the dean. The revision must be
Graduate School Office.

Continuous Registration

All students must maintain continuous registration while wor
a degree, except during the summer session. If continuous re
not maintained, the student is dropped from the degree pro
leave of absence is granted by the Graduate School.

Leave of Absence

If a student is temporarily unable to continue the program of
student may request leave of absence for a specific period
to exceed one calendar year. An exception is made for stud
military leave. A student who is called to active duty may
military leave (see page 49) for the duration of the period of
upon presentation to the Graduate School of a copy of the m
and a request for such leave. When the period of leave has e
the student's responsibility to notify the Graduate School
months in advance of a given registration period of inte
register. If a student fails to re-register, the candidacy is ter

Withdrawal

Graduate students who intend to withdraw from the Grad
should inform the School in writing. The last day for complete
without academic penalty is at the end of the eighth week of

Graduation Requirements

All students must file an Application for Graduation and
quired graduation fee at the time of registration for the last
summer session of the final year in which they intend to gradu
must be registered in the Graduate School during the semester
graduate. Master's and doctoral candidates may graduate in Ma
or September. Students who have completed the requirements
but have not yet been awarded the degree will be issued a
effect upon request.

DEGREES

Listed below are the degree programs of the Graduate School

s and the specific degrees offered, by field. The programs are di-
y the departments concerned. Degree programs which bridge two
departments are directed by committees composed of members
epartments concerned. For further information write to the dean
hairman of the appropriate department.

egrees of Master of Arts in Special Studies and Master of Science
al Studies are designed for students who do not wish to concen-
a specific field such as those listed below, but instead are inter-
interdisciplinary programs. It is possible to group several of these
ogether to make an interdisciplinary program; the program of
is determined by the student in consultation with the Special
Program Steering Committee. The student may choose courses
ose fields pertinent to the student's academic goal; however, a
cannot have more than one-third of the courses from any one
ent. The student must obtain permission to take the courses from
ropriate departments. A one-semester seminar on interdisciplinary
s, for which no academic credit is given, is required of all students.
Graduate School of Arts and Sciences offers programs of study on
leading to the degree of Master of Arts in Special Studies with
rations in Criminal Justice, Human Resources Development,
's Studies, and Philosophy and Social Policy. The School also offers
of Arts and Master of Science in Special Studies degrees in specific
c areas at off-campus locations (see page 102).

e Fields

duate course work offered in support of the degree programs in
wing list is shown by department in this catalogue.

anities	Degrees Offered
ican Civilization	
lcan Literature	M.A. Ph.D.
amics	M.A. Ph.D.
sign	M.F.A.
phics	
nting	
tography	
lpture	
istory	
al Archeology, Classics and History	M.A. Ph.D.
tic Art	M.A.
h Literature	M.F.A.
Literature	M.A. Ph.D.
nic Languages and Literatures	M.A. Ph.D.
y of Religions—Hinduism	M.A.
m Studies	M.A.
	M.A.

d combination of French, Spanish, or Spanish-American Literature is available as
hilosophy field.

Music:
- Applied Music
- Composition
- Conducting
- Music Theory

Musicology
Philosophy
Religion
Religion and Medical Care
Religious Education
Russian Language and Literature
*Spanish American Literature
*Spanish Literature

II. Social Sciences

Anthropology
Economics
Education Policy
Geography
History
†International Relations
Political Science
Sociology

III. Physical and Mathematical Sciences

Applied Mathematics — M.A.
Applied Statistics
Chemistry
Engineering Geology
Forensic Sciences — M.F.S., M.S.
Geochemistry
Geology — M.A.
Mathematical Statistics
Mathematics — M.S. for Teachers
Physics

IV. Biomedical and Related Sciences

Anatomy
Art Therapy
Biochemistry
‡Biological Sciences
Genetics
Microbiology
Mycology
Pathology
Pharmacology
Physiology
Psychology
Radiological Sciences
Speech Pathology and Audiology

* Any approved combination of French, Spanish, or Spanish-American Literature a Doctor of Philosophy field.
† The School of Public and International Affairs offers a Master of Arts field Affairs.
‡ Biology, botany, and zoology.

ɒd Master of Science and Doctor of Medicine Degrees

s interested in the combined degrees of Master of Science and of Medicine must meet the requirements for admission to the e School of Arts and Sciences and to the Doctor of Medicine de- ɒgram of the School of Medicine and Health Sciences.

Master of Science program consists of a minimum of 30 semester f credit and the fulfilling of the tool requirement (see pages 95–96). num of 12 semester hours of credit for graduate-level courses *com- is a part of the Doctor of Medicine degree curriculum* (and not applied toward the bachelor's degree) will be allowed in fulfill- the requirements of the Master of Science degree. The remaining ster hours of work, which in most programs incudes a thesis, must in the basic medical sciences normally required for a Master of degree in the Graduate School of Arts and Sciences.

gram for the Doctor of Medicine and f Philosophy Degrees

rogram is available to qualified students who seek both the Doctor cine and Doctor of Philosophy degrees. The requirements which fulfilled for both degrees are identical to those currently and y established in the School of Medicine and Health Sciences and uate School of Arts and Sciences.

ent working toward these degrees may apply a maximum of 24 hours of approved course work in the School of Medicine and iences toward the minimum of 48 hours of course work required for the General or Cumulative Examination for doctoral candi- s course work is normally taken during the semesters that alter- the medical program and in the years following the award of degree. The student's research for the dissertation may begin tly with the final 24 semester hours of graduate course work the General or Cumulative Examination. The estimated time mpletion of this dual program is six years.

r to enter the dual degree program, a prospective student first y for and gain admission to both the Graduate School of Arts and and the School of Medicine and Health Sciences separately stablished procedures. Upon admission to both schools, the ay then apply for affiliation with the dual degree program. Work e Doctor of Philosophy degree is performed under the jurisdic- lepartmental doctoral committee.

MENTS FOR THE DEGREES

r's Programs

erwise specified, the requirements listed below are applicable es for the degrees of Master of Arts, Master of Arts in Special aster of Fine Arts, Master of Forensic Sciences, Master of ster of Science, Master of Science for Teachers, Master of Forensic Science, and Master of Science in Special Studies.

1. *General Requirements*—For a master's degree program i thesis, the satisfactory completion of a minimum of 30 semeste approved graduate work, including six semester hours of thesis is required. For a master's degree program which does *not* thesis, the number of semester hours of approved graduate cour determined by the department, and normally consists of from semester hours. The program without the thesis is not an indi dent option and is not available in every department. Depart and often do set requirements above the minimum required by ate School. The program of study leading to the degree of Mas in Special Studies or Master of Science in Special Studies con semester hours of approved graduate course work and does no thesis.

Work taken to make up deficiencies is never counted as requirements leading to a master's degree. Upon approval, up of the required graduate work may be taken in courses offe other affiliated institutions of the Consortium of Universities of ington Metropolitan Area, Inc., or by another degree-granting this University. If credit is transferred from another insti "Transfer of Credit," page 96), the number of semester hours be taken at an affiliated Consortium institution is reduced by of hours accepted as transfer credit.

All master's degree candidates must complete degree re within four years. Extensions beyond this time period requir of a written request based on specific and temporary interfer stances.

2. *Academic Work Load*—Full-time students register for nin mester hours each semester; part-time students must register mester hours each semester. These requirements do not apply who have fewer than nine semester hours (full-time) or six sem (part-time) remaining to complete their programs. No mor semester hours may be taken during any one semester.

3. *Transfer of Credit*—A maximum of one-quarter of the sem of graduate course work required for a degree may be approv fer to the Graduate School from the Division of University S other degree-granting division of this University, or another college or university. For a transfer of credit to be approve following conditions must be met: the course work must have prior to admission to the Graduate School, it must be approve the student's program of studies, it must not have been a completion of requirements for another degree, it must be p reate graduate-level course work, it must have been taken wi two years, and the student must have received a grade of B each course for which a transfer of credit is requested. This be made in writing and approved by the departmental advis dean. A transcript of the course work must be on file before can be considered.

4. *Tool Requirement*—Candidates for the degrees of Maste the field of art therapy, Master of Arts in Special Studies, Ma in the field of speech pathology and audiology (nonthesis opti

sic Sciences, Master of Music, Master of Science in Forensic
and Master of Science in Special Studies; candidates for master's
n the Department of Mathematics; and candidates for the degree
r of Fine Arts in the field of dramatic art need not fulfill a
irement. Master's candidates normally must successfully complete
quirement in a foreign language, mathematics, statistics, or com-
gramming, or by graduate course work outside the major depart-
e option [c] below). In place of a tool requirement, candidates for
e of Master of Fine Arts in the fields of ceramics, design, graphics,
photography, or sculpture will complete a methods course
by the Department of Art.

ol requirement examination should be passed prior to the begin-
he third semester of graduate work; students who have not ful-
requirement must register for the appropriate course at the
of the third semester. Students who elect graduate course work
e major department in order to fulfill the tool requirement must
this course work before taking the comprehensive examination
aking thesis work. Courses taken to satisfy the tool require-
ot be counted in the semester-hour requirement for the master's
master's candidate may attempt a tool examination more than
s. A tool requirement fulfilled at another university cannot be
lfill the requirement at this University.

e approval of the department directing the student's program
he tool requirement may be selected from the following options:
ing a foreign language reading examination (a student may
r the appropriate reading course for nonmajors or make arrange-
h the appropriate department to take the examination on the
dates). A student majoring in a foreign language may not select
age to satisfy this requirement. A student whose native language
lish may elect to take an examination of reading and writing
in English as the tool requirement, provided significant academic
the relevant field of study has been published in the student's
guage. Arrangements for this English examination should be
the English for International Students office.
pleting a course in mathematics, statistics, or computer program-
is approved by the appropriate department and by the Gradu-
or passing a special examination covering the approved course
dministered by the appropriate department, at the level of the
nation.

leting with a grade of B or better a minimum of six semester
aduate course work in a department other than the student's
rtment. Three semester hours of this course work will not be
vard the minimum semester-hour requirement of the student's
ram.

esis—The main purpose of a master's thesis is to demonstrate
's ability to make independent use of information and train-
furnish objective evidence of constructive powers in a chosen
tudent registers for six semester hours of thesis research and
ete the thesis no later than three calendar years after the
ration. The student must maintain continuous registration dur-

ing the period required to complete the thesis. Registration fo
search entitles the student to the advice and direction of the
the faculty under whom the thesis is to be written. The thesis s
be approved by the faculty member who will be directing the
thesis, in its final form with one copy and a certificate of appr
by the thesis director and by at least one departmental read
presented to the dean no later than the date announced in the
Calendar. All theses must meet the form, style, and other re
set forth in a pamphlet, *Information Concerning Theses and D*
available in the Office of the Dean.

6. *Master's Comprehensive Examination*—Most master's de
dates must pass a Master's Comprehensive Examination in the
ject. Examinations are held on dates fixed by the departme
results can be filed in the Graduate School Office no later t
before the faculty meets to approve the list of graduates. The
form of the examination is the responsibility of the department

A student who fails to pass the Master's Comprehensive
may, in exceptional circumstances, and with the approval of
ment and the dean, repeat the examination at the next schedu
tion date. If the student fails a second time, no further opportu
the examination is permitted.

The Doctor of Philosophy Program

The minimum requirements for the doctoral program are as

1. *General Requirements*—The program leading to the degr
of Philosophy requires the satisfactory completion of a ma
semester hours of approved graduate work for entering stu
highest earned degree is a baccalaureate. A minimum of 48 c
must be taken in preparation for the General Examination.
dents whose highest earned degree is a master's degree are
register for a minimum of 48 semester hours of approved gra
no fewer than 24 of which must be taken in preparation for
Examination. While completing the dissertation portion of
the student must register for 12 to 24 semester hours of dis
search, depending on the number of hours completed prior t
Examination. The exact number of semester hours required
of the total program is assigned by each department and ma
minimum required by the Graduate School.

2. *Academic Work Load*—Full-time students register for
semester hours each semester; part-time students must re
semester hours each semester. These requirements do not
dents who have fewer than nine semester hours (full-time) o
hours (part-time) remaining to complete their programs.

3. *Transfer of Credit*—Entering students who do not hold
gree may request transfer of up to 24 semester hours of cr
doctoral degree for acceptable post-baccalaureate graduate
the master's degree level at George Washington University
credited college or university.

4. *Tool Requirements*—As early as possible, and *before*
the General Examination, the tool requirements specified b

y must be completed. Various options are available for fulfilling the quirements: each department may permit certain options and not and all individual choices of tool options must have the approval of dent's department and of the Graduate School. Options for fulfilling quirements are as follows:

Two foreign language reading examinations. A doctoral student native language is not English may not elect the native language to foreign language examination requirement. However, with the al of the department and of the Graduate School, such a student ect to fulfill a language requirement by taking an examination of and writing proficiency in English, provided significant academic re in the relevant field of study has been published in the student's language. Arrangements for this English examination should be with the office of the English for International Students program. high-level proficiency in one foreign language.

ubstitution for one foreign language reading examination of an ation, conducted by the appropriate department, in mathematics, s, or computer science. An examination in a graduate course at this ity may satisfy this requirement.

ubstitution of certain graduate course work as follows: a minimum emester hours, completed with grades of *B* or better, in a depart- her than the student's major department, in place of one foreign e reading examination. Certain departments may permit options (d) in place of both foreign language reading examinations; certain ents, as well, may permit 12 hours of graduate course work in an- partment to satisfy the tool requirement.

nts permitted to elect options (a) or (c) above who enter the Grad- ool with a bachelor's degree must satisfy the first tool requirement ompletion of 15 semester hours of course work; students entering naster's degree must satisfy the first tool requirement no later second semester of registration as a candidate for the Doctor ophy degree. Courses taken to fulfill the tool requirement under (a), (b), and (c), and three of the semester hours' credit earned tion (d) (six if option (d) is permitted in place of both foreign reading examinations) will not be counted toward the minimum hour requirement for the degree.

r information regarding the various tool requirements is stated aduate School's *Student Handbook*.

General Examination—Each student is required to complete the Examination no later than the semester following the completion e requirements. The General Examination is composed of a xamination five to six hours in length in each of the areas of study g the student's total program; the time permitted between each on is determined by the administering department. Some de- permit one or two areas of study to be "written off"; that is, a horter examination is given after a year of course work in the umulative examination system is in effect in the fields of chem- physiology, and in the field of psychology a system of two com- e examinations is used. Students in these fields should consult priate department for information about its system.

A student who fails to pass any part of the General Examinat in exceptional circumstances, and with the approval of the de and the dean, repeat the examination at the next scheduled exa date. If the student fails a second time, no further opportunity to examination is permitted.

Satisfactory performance on the General Examination is req admission to the second stage of candidacy for the Doctor of P degree, consisting of the dissertation and final examination. A to the second stage of candidacy is permitted only if the student' Examination committee finds that the student's performance on t nation and in course work gives a good indication of success in t stage. Passing of comprehensive examinations at the minimum not necessarily give this indication.

6. *The Degree of Master of Philosophy*—Upon departmental r dation and approval of the dean, the degree of Master of Philos be awarded to students who have successfully completed all req for the Doctor of Philosophy degree up to and including the Gene nation. Not all departments recommend students for this deg

7. *The Dissertation and Final Examination*—A dissertation is r each doctoral candidate as evidence of ability to perform sch search and interpret its results. The candidate normally enroll *sertation Research* upon completion of the General Examination the candidate may register for up to one-half of the required semester hours of *Dissertation Research* during the time the G amination is being completed. After the required number of dissertation research has been taken, if more time is needed t the dissertation, the student must maintain continuous regist page 49) each semester until the dissertation is finished and th amination is passed. If the dissertation is not completed within from the date the General Examination is completed, the stud required to retake the General Examination.

No later than the date specified in the University Calendar, th must submit to the dean the original and one copy of the disse an abstract for inclusion in the Announcement of the Final E and for reproduction by University Microfilms, Inc.

When the dissertation has been approved by the director and bers of the Doctoral Program Committee and filed with the dean date takes the Final Examination, an oral examination which the public. A committee of examiners (composed of Gradu faculty and, when appropriate, outside scholars) conducts th tion. A sufficient number of copies of the dissertation must be the candidate for the members of the Examination Commi candidate passes, he or she is recommended by the Graduate the degree of Doctor of Philosophy.

Detailed information regarding regulations for the form and ty of the dissertation is available in the Office of the Dean. Th candidate for the doctorate is required, before receiving the pay a fee to cover the expense of printing the Announcement Examination, and for the basic service rendered by Univers films, Inc.

WSHIPS AND FINANCIAL AID

ted number of graduate teaching assistantships and University hips are available in most departments of instruction to students ed in the Graduate School of Arts and Sciences. A limited number r kinds of sponsored and University awards are also available.
nts applying for admission who also wish to apply for a fellowould submit the fellowship application and the application for on by February 15; the necessary transcripts, Graduate Record ation scores, and letters of recommendation should also be on file date. Students currently enrolled in the Graduate School should only the fellowship application and have current letters of recomion on file by February 15.
are available at the Office of the Graduate School of Arts and s. Filing the fellowship application entitles the student to conon for all awards available in the student's department.
nts who wish to apply for loans should indicate their intent to do e application for admission. Information concerning loans is con- a booklet, *Student Financial Aid*, available from the University's Financial Aid Office.

RATIVE PROGRAMS

erican Studies Program at George Washington University is with the American Studies Program of the Smithsonian Institus arrangement offers students in the field of American civilizaopportunity to take advantage of the Washington environment. of the staffs of the Smithsonian's American Studies Program, of History and Technology, National Portrait Gallery, and Naollection of Fine Arts offer seminars and tutorial instruction in ich provide students with an unusual opportunity to develop new ns in the discipline of American civilization. This program of open to students working toward the degrees of Master of Arts or of Philosophy, and is intended to prepare them for research, and museum-related careers.
rt Department of George Washington University and the Smithstitution offer a joint graduate program of study and research in studies leading to the degree of Master of Arts in the field of ry with a concentration in Museum Training. The Department established a program of study in affiliation with the Corcoran f Art, the Freer Gallery, the Hirshhorn Museum and Sculpture he Museum of African Art, the National Collection of Fine Arts, ps Collection, the Renwick Gallery, and the Textile Museum. The In Museum Studies also involves the cooperation of several nts with museums in Washington.
ram of study leading to the degree of Doctor of Philosophy in Civilization with emphasis on library research and collections is intly by George Washington University and the Library of Con- coordinator of the Library Program and the staff offer an orienninar and other courses and supervise students in reading and

research and in work on such library problems as indexing, ca and bibliography.

For further information concerning these programs contact o following offices at George Washington University: the Gradua of Arts and Sciences for those who are interested in any of the fie above, the Art Department for those interested in art museum tra American Studies Program for those interested in the field of civilization.

George Washington University, in cooperation with three o versities and the Folger Shakespeare Library, has established t Institute for Renaissance and 18th-century Studies as a cooper ture in graduate studies in the humanities. Seminars (limited to 1 each) are offered each semester under the direction of Ame foreign scholars. The Folger Library forms the core of the Ins participants enrolled in the seminars are granted access to the of rare books, manuscripts, and reference materials of the Libr are also opportunities for participants to form contacts with th and readers at the Library, in the process of their research. All students are eligible to apply for admission to one or more of the although priority in enrollment will be accorded graduate stude ing on dissertations and postdoctoral scholars from the spon stitutions.

Further information, including a listing of seminar topics, is in the Office of the Graduate School of Arts and Sciences or at Shakespeare Library.

The University and the National Bureau of Standards have e a cooperative agreement to further educational opportunity a University and the Bureau. This arrangement holds promise fo study and research, with emphasis in the physical sciences.

SPECIAL OFF-CAMPUS DEGREE PROGRAMS

The Graduate School of Arts and Sciences is currently offer lowing special degree programs off campus: (1) the degree of Arts in Special Studies with areas of concentration in Crimi Legislative Affairs, Social Policy, or Urban Learning, and (2) of Master of Science in Special Studies with areas of conce Environmental Science, Social and Economic Statistics, an munication Operations.

The Graduate School has academic jurisdiction over these programs which are administered by the College of General St all of these programs may be available in any given year. consult the Graduate School of Arts and Sciences.



OOL OF EDUCATION AND
IAN DEVELOPMENT

R. Tillman
ant Dean R.E. Baker
tive Assistant to the Dean L.H. Kornhauser

LTY*

sors J.G. Allee, Jr., R.E. Baker, J.G. Boswell, P. Botwin, J.L. Breen, Brenner, M.E. Coleman, R.S. Cottrell, Jr., L.H. Elliott, R.J. Frankie, awkins, R.K. Ives, S. Kavruck *(Visiting)*, D. Linkowski, A. Marinac- M. McIntyre, D.A. Moore, L. Nadler, M.N. Rashid, D. Sinick, J.E. lgrass, L.M. Stallings, R. Tillman, C.E. Vontress, L. Winkler
t Professor D.C. Paup
ate Professors M. Burns, A.L. Dickerson *(Research)*, J.W. Fleck, L.H. ge, J.A. Greenberg, J.C. Heddesheimer, G.L. Horrworth, E.P. Kula- S.R. Paratore, R.I. Peterson, J.R. Shotel, G.W. Smith, G.D. Wiggs, Withers
nt Professors M.S. Castleberry, R.N. Ianacone, N.D. Johnson, G.A. ro *(Research)*, H. Nashman, N.J.S. Sobel, N. Tiscione, L.A. Tsantis
t Assistant Professors C.V. Gordon, Jr., J. Noel
tors M.B. Freund *(Research)*, M. Gazvoda *(Research)*, A.H. Morris earch), D.C. Park *(Research)*

rs of the Advanced Graduate Faculty

ker, J.G. Boswell, P. Botwin, J.L. Breen, M. Brenner, W.T. Carroll, stleberry, R.S. Cottrell, Jr., L.H. Elliott, R.J. Frankie, J.A. Green- Hawkins, J.C. Heddesheimer, G. Horrworth, R.K. Ives, E.P. Kula- Linkowski, A. Marinaccio, D.A. Moore, L. Nadler, S.R. Paratore, erson, M.N. Rashid, C. Reeder, J.R. Shotel, D. Sinick, G.W. Smith, dgrass, L.M. Stallings, R. Tillman, L.A. Tsantis, C.E. Vontress, ggs, L. Winkler

tees†

N'S COUNCIL‡

A. Moore, J.R. Shotel
C. Paup, L.A. Tsantis
H. George, G.A. Lofaro

dent of the University, the Vice President for Academic Affairs, the Registrar of the the Director of Admissions of the University, and the University Librarian are ex bers of the Faculty of the School of Education and Human Development and the assistant dean of the School of Education and Human Development are nembers of all committees.
the Faculty in the year designated to a three-year term

COMMITTEE ON ADMISSION AND ADVANCED STANDING*

R. Tillman *(Chairman)*, P. Botwin, J.L. Breen, D. Linkowski, J.Y. Ru

COMMITTEE ON SCHOLARSHIP

R. Tillman *(Chairman)*, P. Botwin, J.L. Breen, D. Linkowski

INTRODUCTION

The University began offering professional courses for teachers i and in 1907 it established a Division of Education. In 1909 the D Education became the Teachers College which in its early years cerned largely with teacher preparation on the undergraduate le

In 1928 the Teachers College became the School of Education a provision was made for advanced study. Since that time the gr rollment has steadily increased, with the result that today the Sc considerably larger number of graduate than undergraduate st reflect the current scope of its offerings, the name of the S changed in 1977 to the School of Education and Human Deve

The School of Education and Human Development prepares resource and support personnel, and administrators for educatio The School also offers opportunities to experienced teachers and enrich their education. The programs are designed to meet needs of all persons who seek the knowledge and skills necess vide for effective learning and teaching. The School's program the needs of persons interested in the traditional elementary a ary school environments, but also include the preparation of for all areas of education covering the life span from pre-sch the adult years in both the public and private sectors of s following graduate programs are representative: Generic Adult Education, Human Resource Development, Rehabilitati ing, College Student Development, Higher Education, Dance, hood Education and Early Childhood Special Education, Perce Development, Therapeutic Recreation, and Tourism Develo Travel Administration.

A Bachelor of Arts in Education is more than preparation f in schools. The degree provides background and experiences ment in a variety of public and private settings. A majority hours of required courses are in the liberal arts. In addition, th provide opportunities for students to develop critical thinking ing, as well as leadership, organizational and planning skills placed upon developing the human relationship qualities that in fields that require involvement with people in all age ran all walks of life.

The School of Education and Human Development is the unit for three departments: Education, Human Kinetics Studies, and Special Education. In addition to programs of to its degrees, the School offers credit and non-credit worksh

* Appointed by the dean.

ally to meet the unique needs of metropolitan area school systems, er clients in private industry and in government.

ial curricula are tailored on an individual basis for liberal arts es and graduates of other professional schools who are interested hing. The School also offers a wide range of courses for teachers ish to renew licenses and for provisional teachers who wish to for teaching certificates.

ratory and clinical facilities are provided by the University Reading and the Speech and Hearing Clinic. Field experiences are provided eration with public and private schools, social agencies, museums, ions in the business community, and community and junior colleges. schedule of courses is arranged to meet the convenience of both e and part-time students.

ional Courses for Non-Education Majors

s in Columbian College, both those who have declared a major ose who are undecided, may take up to 12 semester hours of in Education, Human Kinetics and Leisure Studies, or Special on, and may include them in the hours of credit required for the r's degrees in Columbian College. Students electing professional under this rule must obtain the approval of the dean of Columbian before registration.

School of Education and Human Development has made dramatic in its total curriculum. Freshmen and sophomore students are quired to take each semester a professional education course that s field work experiences. Some of these courses make it possible dents who are undecided about their choice of a career to have an nity to test teaching and some of the many related helping areas.

ollowing professional courses are open to non-education majors: 0, 101, 102, 105; HKLS 102, 104, 121, 150, 152, 158, 164; and SpEd , 230, 231, 232, 233, 234, 235, 236, 263, 264, 270, 271, 273 and 290.

on for Teaching

ns of study in education for teaching are based upon the assumpt every teacher should have a broad general education, mastery ontent of instruction, and professional competencies.

elative emphasis placed upon each of these aspects of the total n for teaching varies in accordance with the purposes of each . For instance, since elementary school teachers teach all subjects, uire content preparation of greater breadth and less specialization condary school teachers.

he view of the School of Education and Human Development that otable minimum education for teaching requires four years of full- dy or the equivalent in part-time study. For superior preparation are urged to plan for five years of full-time study or the equiva- part-time study.

tudent may choose any one of the following plans to achieve educational preparation for teaching:

1. Upon receiving the bachelor's degree in education, he or take a teaching position and, after acquiring some profes perience, return to the School for graduate study leadin master's degree. This plan enables students with bachelor's to begin their teaching careers, and to use their work exper enhance graduate study which will follow.
2. The student may choose to pursue full-time graduate study to the master's degree immediately after receiving the b degree.
3. A student whose bachelor's degree is in one of the liberal ciplines may choose to complete the requirements for cer for teaching by studying in one of the teaching fields in a custom-tailored to his or her particular needs.

REGULATIONS

University regulations concerning admission, registration, f finances are stated on pages 20–34; other University regulations. 45–53.

General Scholarship Requirements For Undergraduates

Regulations regarding academic standing, probation, suspensi drawals, classification of students, required placement examina waiving introductory courses by examination appears on pages and 77 of this *Bulletin*.

ACADEMIC WORK LOAD

Fifteen to 17 semester hours of credit constitute a normal pr student with a quality-point index of 3.00 or higher may, wit mission of the dean, enroll for 18 or 19 hours. No student may more than 19, except by permission of the Committee on Scho

The following work load regulations apply to both graduate a graduate students.

Students employed 15 hours or less a week may carry a no gram of college work.

Students employed from 16 to 25 hours a week may enroll 13 hours. Those with a quality-point index of 3.00 or higher special permission of the dean,* enroll for 15 or 16 hours.

Students employed from 26 to 34 hours a week may enroll fo hours. Those with a quality-point index of 3.00 or higher special permission of the dean,* enroll for 12 or 13 hours.

Students employed 35 hours or more a week may enroll f hours. Those with a quality-point index of 3.00 or higher special permission of the dean,* enroll for 9 or 10 hours.

Students who increase their hours of employment after regis

* Request forms are available at the office of the dean. They should be filled out to the office of the dean at least two weeks prior to registration.

y time during a semester must report immediately to the dean so heir programs may be adjusted, if necessary.
duate students employed full-time may take a maximum of 6 se-r hours, unless special permission to take more is granted by the *

RED PLACEMENT EXAMINATIONS

lish—Students whose College Board English Composition Achieve- Test scores suggest that they will benefit from more intensive ng in compositional skills may be assigned to English 9 or may be in vocabulary, spelling, grammar, standard usage, and writing skill e placement in either Engl 9 or 10.
eign Languages—A student who has not been granted advanced ng and who wishes to continue in college the language begun in chool must take a placement examination in one of the following: se, French, German, Greek, Hebrew, Italian, Latin, Russian, or h. Upon completion of the examination, assignment is made to the priate course.
hematics—New students accepted for registration in Math 30 are ed, prior to registration, to take a placement examination in algebra rigonometry; those accepted for registration in Math 51 are re- , prior to registration, to take a placement examination in algebra. pecific six semester hours mathematics requirements listed under ntary or secondary education majors.)

NG CREDIT BY EXAMINATION

graduate students may earn semester-hour credits up to a maximum hours by performing satisfactorily on College-Level Examination m (CLEP) Tests or special departmental examinations provided by partments of Columbian College of Arts and Sciences on an indi- basis. *Passing a waiver examination does not entitle the student to* mester hours *of credit.*
ents interested in becoming certified to teach who have earned or's or graduate degrees in fields other than education may satisfy certification requirements by taking the CLEP Examinations or spe- partmental examinations. See pages 22–23 for general information CLEP tests, and for information on special examinations offered by nents.

ACHELORS' DEGREES

hool of Education and Human Development offers undergraduates ns leading to the degrees of Bachelor of Arts in Education (Ele- y Education, Secondary Education, Middle School, and Human s) and Bachelor of Science in Human Kinetics and Leisure Studies ntary and Secondary Human Kinetics and Leisure Studies, Dance on, and Dance Specialization in the Performing Arts).

forms are available at the office of the dean. They should be filled out and returned ce of the dean at least two weeks prior to registration.

Bachelor of Arts in Education

The programs leading to the degree of Bachelor of Arts in Educ planned to provide (1) general educational backgrounds, (2) fo command of concepts and skills in one or more teaching fields, (3) of basic professional information and skills adequate for the b teacher, and (4) development of attitudes needed for success in or in other related human services fields.

The general educational backgrounds needed by prospective or by persons interested in being employed in other human servi are obtained through college courses, work experience, leadersh ties, and off-campus cultural opportunities.

As part of formal course work, and on their own initiative, stu the School of Education and Human Development are expected to advantage of the many opportunities in the Washington area for ing leadership skills. Advisors are available to help students p experiences.

Persons preparing for teaching or for work in other human fields require a well-rounded education. In this connection, completing a 126-semester-hour program in elementary educati University will complete approximately 78 credit hours in the li a major in secondary education will complete approximately hours in the liberal arts. Liberal arts courses and selected pr education courses may be completed at George Washington Uni may be accepted for advanced standing from another accredited in accordance with regulations on page 22.

Experienced registered nurses and persons engaged in rela services or other human services areas may fill the requirements in Education by completing 120 credit hours. Advanced standi granted for courses completed in two- and three-year program munity or junior colleges and at teaching hospitals.

General Information for Freshmen and Sophomores

All undergraduates admitted directly to the School of Educ Human Development are assigned academic advisors at the ti mission. Advisors are designated to provide continuity of ad students throughout their years of undergraduate study. The pr each student must be approved by a faculty advisor.

Since each student's program is defined by individual n important that students have a clear concept of their major education, and that they be familiar with the certification re of those localities in which they expect to teach. Informatio licensing requirements is available in the Career Services Offi in Woodhull House, 2033 G St., N.W.

Entrance Requirements for Freshmen and Sophomores

Good character and an academic background appropriate for th of studies contemplated are required.

Requirements for admission to the freshman and/or sopho are as follows:

An acceptable certificate of graduation from an accredited secondary , showing at least fifteen units* which must include four years of h; at least two years of one foreign language; two years of science, ably with laboratory instruction; two years of social studies, one ch must be American history; and two years of college preparatory matics.

he principal's statement that the applicant is prepared to undertake e work.

ollege Entrance Examination Board scores submitted on the Scho- Aptitude Test and the English Composition Achievement Test. recommended that the examinations be taken in December or y of the senior year. Scores on tests taken in the junior year may mitted. Arrangements for tests are the responsibility of the appli- nd should be made with the Educational Testing Service, 20 Nassau rinceton, N.J. 08540; or 1947 Center St., Berkeley, Cal. 94704, s than one month before the date of the test. In applying for the e applicant should specify that the scores be sent to the Office of sions, George Washington University, Washington, D.C. 20052. College Entrance Examination Board tests are preferred; however, nerican College Testing battery scores will be accepted. The appli- ould request that these scores be sent to the Office of Admissions y from the American College Testing Program, Iowa City, Iowa. It mmended that the applicant take the tests in October of the senior

School of Education and Human Development will consider the cy of the qualifications of an applicant who, because of unusual stances, does not present all of the formal requirements stated The School may require appropriate scholastic-aptitude tests. national students may be considered for admission with an equiva- reign secondary certificate. A student presenting such a certificate lso show competence in the English language and may be required ll in a full-time program in English for Foreign Students before ng studies in a degree program. Requirements will be determined basis of an English Proficiency Test administered on-campus. A ate who submits a score of 580 or above on the Test of English reign Language (TOEFL) may be excused from taking further course n English as a foreign language.

ents who have been out of secondary school for three years or nd/or do not meet the above requirements may take a special bat- admission testst by contacting the Office of Admissions or may idered for admission to the School of Education and Human Devel- on a conditional basis. To be admitted into the School's degree n, a conditionally admitted student must complete a trial program emester hours of course work with a quality-point index of 2.25 er. This trial program must include one professional course and nal courses selected from the first-year curricula of the undergrad- gree programs in Education.

*epresents a year's study in a secondary school subject, including in the aggregate not 120 sixty-minute periods, or the equivalent, of prepared classroom work.

sts include, among others, the Differential Aptitude Test, Cooperative English Exami- Ohio Psychological Test.

The selection of courses to be taken in the trial program must in conference with a faculty advisor in the School of Education an Development. A conference concerning plans for study as a degr date is required of each applicant at the beginning and end of program. Upon successful completion of the trial program, the stu has submitted an application for degree candidacy should ask missions Office to reconsider his or her application.

Admission with Advanced Standing

Requirements for admission of students transferring from other r accredited colleges and universities, and from other divisions University, are as follows:

Students who have accumulated 15 hours or more of acadeni at another regionally accredited college or university with an a program and acceptable grades may be admitted to the School o tion and Human Development. Advanced standing may be awa properly certified courses taken at regionally accredited college versities for which the student received a grade of C or better, be applied toward a degree provided that such courses are co to the curricular requirements of the degree at GW.

Although a grade of D is not acceptable for transfer, the cours used to satisfy a curricular requirement. Credits earned with a may not, however, be counted toward advanced standing.

The School reserves the right to refuse credit for transfer or in part or to allow credit provisionally.

It is the responsibility of the student to have an official transc directly from each institution formerly attended to the Office sions, George Washington University, Washington, D.C. 20052.

Students may transfer from another division of this Univer a degree program in the School of Education and Human Dev The student must present an accumulated quality-point index higher at the time of transfer. A student wishing to transfer School from another division of this University must submit application of transfer and meet other requirements for accepta School.

Courses taken at another division of this University may b toward a degree in this School provided they are comparable to ricular requirements of the degree.

Nurses filing for admission to the B.A. program in Human Ser required to submit a copy of their current state nurse's re (license) in addition to the official transcripts.

Students applying for transfer from another accredited university or from another division of this University whose academic records raise doubts of their ability to complete degree ments successfully may be admitted to the School of Education a Development on a conditional basis. To be admitted into the Schoo program, a conditionally admitted student must complete a pres program of 15 semester hours of course work with a quality-p of 2.25 or higher. A student registered in another division of this who has an accumulated quality-point index of less than 2.00 a

onally admitted to this School must earn a 2.25 quality-point index trial program and must during this trial program bring the accumu- uality-point index to 2.00 or higher to be admitted to the School's program.

selection of courses to be taken in the trial program must be made in nce with a faculty advisor in the School of Education and Human pment. A conference concerning plans for study as a degree can- is required of each applicant at the beginning and end of the trial n. Upon successful completion of the trial program, the student who omitted a degree-candidate application will be advanced to degree

ements for the Degrees

recommended for a degree a student must satisfy the admission, ce, scholarship, and curriculum requirements. The Bachelor of Arts cation (elementary, secondary, and middle school education) requires nester hours; the Bachelor of Arts in Education (human services) s 120 semester hours; the Bachelor of Science in Human Kinetics isure Studies (elementary/secondary human kinetics and leisure , dance education, and dance as a performing art) requires 124 er hours.

NCE

ates for the bachelor's degree must complete satisfactorily while in hool of Education and Human Development a minimum of 30 er hours.

LIST

ligible for the Dean's List a full-time student must obtain a quality- dex of 3.5 on courses completed during the past semester. A part- dent, to be eligible, must obtain a quality-point index of 3.5 on the semester hours of course work. Such part-time students must have nrolled for at least one three-hour course each semester, and resi- during the period involved must be continuous.

RSHIP REQUIREMENTS

system of grading and of computing scholarship, see pages 45–46. der to graduate, a student must have a quality-point index of at 25. A quality-point index of at least 2.25 is required before per- is granted to do student teaching in the senior year.

tion—A student who fails to maintain a quality-point index of at 25 is placed on probation. The student remains on probation as long ndex is below 2.25, or until probation is removed by the Committee olarship.

ension—A student on probation who fails to raise the index to 2.25 the time specified may be suspended.

A student suspended for poor scholarship may, within 10 da
the case through the dean to the Committee on Scholarship. I
appears to be remediable and the student's scholarship seems
improve, the Committee may readmit the student on probation.
denied readmission may again, after a lapse of a calendar year, p
Committee through the dean for readmission. A student suspen
will not be readmitted.

CURRICULUM REQUIREMENTS

In all bachelor's curricula at least 30 semester hours must
courses numbered above 100.

CREDIT/NO CREDIT OPTION

A junior or senior student who has a cumulative quality-point
2.50 or better, may, with the approval of an advisor and the
one course a semester and receive a grade of *CR* (Credit) or *NC*
which will be recorded on the student's transcript but will not b
in the student's quality-point index. No student will be allowe
more than four credit/no credit courses. Students must sign u
an option at registration. Under no circumstances may stude
from credit/no credit status to graded status, or vice versa, af
of registration. Courses required in the student's major fiel
be taken on the credit/no credit basis. A transfer student may
this option until the second semester of enrollment at this U

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W*
Withdrawal) may be assigned are described on page 46.

Removing an Incomplete—Although the grade of *I* may rem
records for a maximum of one year, the instructor should no
much briefer period within which the uncompleted work (usua
examination or a required paper) must be made up. The grade
be removed by reregistering for the course here, or by taking
lent elsewhere. An "Incomplete" cannot be made up after
one calendar year except by written permission of the Dean's

National Teacher Examinations

All candidates for the degree of Bachelor of Arts in Education
to take the National Teacher Examinations. Students receive
reports of test scores and may avail themselves of the regula
services of the Educational Testing Service. Students must
Testing Service to send copies of test scores to the School
and Human Development.

Students required to take the Examinations must register fo
the Educational Testing Service. Application forms are avail
office of the dean.

ing-Field Programs

CT-AREA SPECIALIZATION

ct-area specialization depends upon the teaching position for which dent is preparing. Those planning to teach in elementary schools need ee of competency in several fields. Those preparing to teach in middle ls must acquire competency in a chosen interdisciplinary subject- specialization. Those preparing to teach in junior or senior high ls must demonstrate competence in a major teaching field. A teaching field is optional, but recommended. The student should teaching-field preparation during the first two years.

ching-field requirements, developed in cooperation with appropriate ments of the University, include satisfactory completion of pre- d academic courses in one or more fields, a satisfactory score on the l field examination of the National Teacher Examinations* and satis- y completion of the prescribed special methods courses.

cribed academic courses vary in number in accordance with the and complexity of the teaching field and the licensing requirements various states.

sional Education

sic professional information, skills, and attitudes needed by begin- eachers are provided through a sequence of courses to be taken hout the four years of undergraduate study. Lectures and class sions are closely coordinated with field work. Instruction is differ- —elementary, middle, junior high, and senior high school.

prescribed courses in special methods are concerned primarily ethods of initiating, guiding, and evaluating learning experiences with the content of teaching fields. They attempt to bring to the t specific suggestions drawn from the accumulated experience of sful teachers. In addition, the courses review the teaching-field t currently in use in schools.

ion Curriculum

llowing is the program for the first two years in preparation for chelor of Arts in Education degree with major fields in elementary ondary education (including elective areas of certification in early ood education and special education).

		Semester Hours
Education:	Educ. 101, 102, 103, 104	12
English:	Composition—Engl 9 or 10, 11 or 12	6
	Literature—Engl 51–52, 71–72, or 191–92	6

field examinations of the National Teacher Examinations are available in elementary ; early childhood education; biology and general science, English language and litera- hematics; chemistry, physics, and general science, social studies, music education; education. Students preparing to teach history or geography take the special field on in social studies. Students preparing to teach in fields in which special field ns are not available must obtain a satisfactory score on a special field examination the instructor in the special methods course involved.

Mathematics:	Math 9 and 10 (for elementary education majo and two semesters chosen from Math 3, 6, 9, or (for secondary education majors)
Science:	Three semesters (2 in biological science and in physical science or vice versa) for elementa education majors and two semesters for seconda education majors. Courses are to be chosen fr BiSc 3–4 or 11–12; Chem 3–4 or 11–12; Geol 1- or Phys 1 and 2, or 9–10
Social Studies:	Hist 71–72 for elementary education majors a Hist 71–72 or PSc 1 and 2 or 2 and 3 for seconda majors
	Six semester hours selected from the followi AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 a 52; Hist 39–40; Hist 71–72; PSc 1 and 2; PSc 2 a 3; or Soc 1 and 2
Speech and Drama:	SpDr 1 or 11
Electives:	
	Total

Human Kinetics and Leisure Studies Curriculum

The following is the program for the first two years in prepa the Bachelor of Science in Human Kinetics and Leisure Studie with specialization in Elementary/Secondary Human Kinetics an Studies in the School of Education and Human Development. should begin to acquire competency in several physical activiti first two years.)

Education:	Educ 104
	Educ 102 or 103
English:	Engl 9 or 10, 11
Human Kinetics and Leisure Studies:	Four semester hours selected from first-g HKLS courses: 59, 60, 61, 62 recommended
Mathematics/ Science:	BiSc 3–4; Chem 3–4; Geol 1–2; Math 9 and 1
	Phys 1 and 2, or 9–10
Social Studies:	Hist 71–72, or PSc 1 and 2 or 2 and 3
	Six semester hours selected from one of the lowing combinations: AmCv 71–72; Anth Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 7 PSc 1 and 2; PSc 2 and 3; or Soc 1 and 2
Speech and Drama:	SpDr 1 (or 11 if recommended by the departm
Electives:	
	Total

First two years in preparation for the Bachelor of Science in Hum ics and Leisure Studies degree with a specialization in dance ed

Education:	Educ 102, 103

English:	Engl 9 or 10, 11	6
Kinetics and sure Studies:	HKLS 107, 108, 150, and 157	11
	Any combination of dance courses numbered 10–58, 121, or 123	6
Mathematics/ Science:	BiSc 3–4; Chem 3-4; Geol 1–2; Math 9–10; Phys 1-2, or 9–10	6
cial Studies:	Hist 71–72; or PSc 1–2	6
	AmCiv 71–72; Anth 1–2; Econ 1–2; Geog 51–52; Hist 39–40; PSc 1-2; or Soc 1–2	6
h and Drama:	SpDr 1, 11, 121, or 169	3
Electives:		14
	Subtotal	54

vo years in preparation for the Bachelor of Science in Human and Leisure Studies degree for students interested in dance as a ing art:

		Semester Hours
English:	Engl 9 or 10, 11	6
Kinetics and sure Studies:	HKLS 150, 157	6
	Any combination of dance courses numbered 10-58, 121, or 123	6
Humanities:	Art 21–22, 31–32; Mus 1, 3, or 4; Phil 50; SpDr 45	6
Mathematics/ Sciences:	BiSc 3–4; Chem 3–4; Geol 1–2, 5; Math 3, 6, 9, 10; Phys 3, 4, 9, 10	6
cial Studies:	AmCv 71-72, Anth 1-2; Econ 1-2; Geog 51, 52, Hist 39–40; 71–72, PSc 1-2 or 2-3; Psyc 1, 5-6, 8, 22, 29; Soc 1, 2	6
Electives:		24
	Subtotal	60

aching-field programs and their requirements are as follows:

ary Education Program

EDUCATION REQUIREMENTS (See pages 74-75.)

AREA SPECIALIZATION.

		Semester Hours
Art:	Survey course to be selected with advisor's approval	3
Music:	Survey course to be selected with advisor's approval	3
Econ 1:	Principles of Economics	3
Geog 51:	Introduction to Geography, or	3
Geog 52:	Introduction to Economic Geography	3

Hist 71-72:	Introduction to American History
HKLS:	As approved by the advisor
Math 9-10:	General Mathematics I, II
*Science:	As approved by the advisor
Social Studies:	As approved by the advisor

PROFESSIONAL COURSES

Thirty-six credit hours are required, consisting of Educ 105, 108, 112, 135.

Students majoring in elementary education may prepare for tional area of certification by substituting for elective courses sequence of courses in early childhood education or special Consideration should also be given to taking courses that are reco under Teaching Emphases listed on page 119.

AREA OF CERTIFICATION IN EARLY CHILDHOOD EDUCATION

Eighteen credit hours are required, consisting of Educ 132, 150, 154.

AREA OF CERTIFICATION IN SPECIAL EDUCATION

Twenty-four credit hours are required, consisting of SpEd 101, 170, 189, 190, 199.

Middle School Education Program

The middle school education program offers four teaching-field s tions together with appropriate professional training. While the i of a thorough understanding of the nature of the middle school le the middle school is emphasized, equal stress is placed on early tinued direct experiences in the middle school. This experience c in a senior-year block instructional program conducted large field.

GENERAL EDUCATION REQUIREMENTS (See pages 74-75.)

SUBJECT AREA SPECIALIZATIONS

Communications: 30 credit hours
Life Science: 30 credit hours
Earth/Space Science: 30 credit hours
Social Science: 30 credit hours

* The science requirement must include courses in both physical and biological

SSIONAL COURSES

-six credit hours are required, consisting of Educ 105, 110, 112, 134, ial methods course selected from Educ 136, 137, 138, and 144, and es planned with an advisor.

dary Education Programs

secondary education program a number of teaching-field specializa- are offered. However, it is strongly recommended that, wherever le, a candidate undertake the equivalent of a minor in an inter- linary subject area. Early counseling by the program advisor is urged ure a balanced and realistic program of study. The requirements secondary education program are as follows:

AL EDUCATION REQUIREMENTS (See pages 74-75.)

CT AREA SPECIALIZATIONS

39 credit hours
gy: 46 credit hours
istry: 40-44 credit hours
Science: 46-49 credit hours
h: 39 credit hours
h: 45 credit hours
al Science: 41-47 credit hours
aphy: 24 credit hours
an: 32 credit hours
y: 42 credit hours
matics: 39 credit hours
: 42 credit hours
s: 36 credit hours
n: 36 credit hours
Studies: 42 credit hours
sh: 42 credit hours
h and Drama: 36 credit hours

SSIONAL COURSES*

equirements are 21 to 27 credit hours, consisting of Educ 105, 108, 31, 134, and 3 to 6 credit hours selected from Educ 136, 137, 138, 139, 44, 146.

or of Science in Human Kinetics and Leisure Studies

program, which is designed to prepare students for teaching in ntary and secondary schools, offers opportunities for specialization ce education and elementary or secondary school physical educa-

se in the teaching of reading is recommended since it is required for employment in risdictions.

tion. A program is also offered in dance as a performing ar
not interested in certification for teaching.

Prerequisite—For the first two years of the Bachelor o
Human Kinetics and Leisure Studies curriculums, see pages 11

Specialization in Dance Education, junior and senior year
The following courses are required: Educ 104, 108, 112; HKLS
119, 133, 135-36, 141-42, 144, 150, 151, 164, 175.

Specialization in Dance as a Performing Art, junior and se
The requirements consist of 10 credit hours selected from HKL
or 123; and HKLS 108, 109-10, 120, 135-36, 137, 141-42, 144, 17

Specialization in Elementary/Secondary Human Kinetics
Studies, Junior Year—The thirty credit hours of required cou
HKLS 102, 103, 111, 112, 114, 130, 150, 151, 158, and Educ 105.
—From 27 to 33 credit hours are required, including HKLS 11
138, 139, 164, 171, and Educ 112.

Bachelor of Arts in Education—Program in Human Services

The program in Human Services is designed for registered
other persons engaged in various human services areas who ar
in completing requirements for the degree of Bachelor of Arts in

The program in Human Services is planned to: (1) enable
to develop their cognitive and affective abilities; (2) meet a rang
services needs; (3) develop human interaction and leadership
facilitate entry into or advancement in human services occupatio
an awareness and appreciation for interacting values in a
society; and (6) prepare for graduate study in a professional fi

The program features a variety of fieldwork and classroo
seminars, and consultation. Opportunities are provided for ac
with diverse human service settings and professionals in the
for academic concentration in departments throughout George W
University.

Programs for students will be individually planned after an
is made of previous professional and educational experiences
range goals.

Advanced standing may be awarded for liberal arts and sc
courses completed at accredited colleges and universities. Advan
ing will be granted for registered nurses who have completed
programs at accredited teaching hospitals—30 credit hours
programs and 45 credit hours for 3-year programs. This cred
courses completed in the sciences, but does not include other
courses.

Students will be required to complete the following liberal a
ments for the degree, either in previous work at another insti
George Washington University.

English:	Composition—Engl 10, 11
	Literature—Engl 51, 71, or 191
Mathematics:	Math 3, 6, 9, or 10
Psychology:	Psyc 1

Science:	BISc 3, 4; Chem 3, 4; Geol 1, 2; Phys 1, 2; Phys 9, 10	
cial Studies:	Hist 71, 72; or PSc 1 and 2 or 2 and 3	6
and Drama:	SpDr 1	6
		3

ng Emphases for Majors in Education and Kinetics and Leisure Studies

hool of Education and Human Development offers courses and pro- that are educationally sound and enriching and that enhance op- ties for graduates to obtain teaching positions throughout the States. Special teaching emphases have been developed, consisting rses which students are encouraged to select to satisfy elective n their programs in elementary or secondary education.

hing emphases are offered in the following areas:

ling
tional Education
ent Education

Reading
Speech Pathology and Audiology
Tourism

teaching emphases are designed to focus on areas of recognized or elementary and secondary pupils throughout the nation, particu- hose in large urban centers. Graduates of these programs, with their skills and understandings in these critical areas, should be attractive lates for teaching positions.

eld that has experienced significant growth, both nationally and tionally, is tourism. The academic advisor in tourism will try ist students who select this sequence to find part-time work in agencies and bureaus to enhance classroom experience.

y of the courses offered in the teaching emphases have been taken y from master's degree programs of the School of Education and Development and assigned undergraduate numbers.

ents interested in more detailed information about these sequences couraged to contact the Dean's Office, School of Education and Development, or their academic advisors.

following represents a breakdown of the specific courses offered of the teaching emphases:

ce and Counseling: Educ 161, 162, and 163.

tional Education: Educ 171, 172, and 173.

ent Education: HKLS 101, 102, 113, 129, and 130.

g: Educ 100, 110, and 111.

Pathology and Audiology: SpDr 1, 101, 103, 104, 106, 118, 119, and 115.

n: HKLS 104, 113, and 184.

ATE STUDY

hool of Education and Human Development offers graduate pro- eading to the degrees of Master of Arts in Teaching, Master of Education, Education Specialist, and Doctor of Education.

GRADES

For graduate work, grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *E*, Audit. Grades *A*, *B*, *C*, and *F* are counted in computing the quality-point average (see page 46).

Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given to the instructor for the student's failure to complete the required work of the course. "Incomplete" cannot be made up after the lapse of one calendar year except by written permission of the Dean's Council. An "Incomplete" which is not removed within one calendar year is automatically changed to an *F*. An "Incomplete" cannot be removed by reregistering in the course.

THE DEGREE OF MASTER OF ARTS IN TEACHING

The School of Education and Human Development offers an interdisciplinary fifth year in museum education. This program is designed to prepare selected liberal arts graduates, postgraduates, and professionals for education work in a museum or for liaison work between museums and school systems. Students receive the degree of Master of Arts in Teaching upon completion of the program.

For details write the chairman of the Department of Education, Museum Program, School of Education and Human Development, George Washington University, Washington, D.C. 20052.

ADMISSION

To be admitted to the program in museum education an applicant must have a bachelor's degree from an accredited institution; (2) submit two written references attesting to quality of academic record and work experience; and (3) be interviewed by the University Selection Committee or make alternative arrangements specified by the Committee and approved by the dean of the School of Education and Human Development. Considered essential are skills in communication, a desire to study and learn from the artifacts of nature and civilization, and an ability for and interest in working with people. Evidence of strong undergraduate, graduate, or professional experience in such fields as American history, geology, or the social sciences will be considered favorably.

PLAN OF STUDY FOR THE MUSEUM EDUCATION PROGRAM

The program begins with a six-week summer session. Emphasis is on the study of museums and communication skills. During the fall

s study the school as an institution—its organization, pupil popula-
aff and services—and as a laboratory, where they will work in class-
with students and teachers. The program will also focus on other
n audiences. Students will earn at least 12 semester hours of credit
academic concentration. During the spring semester students will
internship in area science, art or history museums.

EGREE OF MASTER OF ARTS IN EDUCATION

ms of study leading to the degree of Master of Arts in Education
signed to enable prospective teachers and experienced teachers
ease their professional and academic knowledge and skills and to
e for special types of educational service. They also provide op-
ties for college graduates in other disciplines to acquire needed
ional education, as well as study in the subjects which are directly
to their professional objectives.
ter's programs are available in the fields listed on the following

ve Physical Education

imary goal of the adaptive physical education degree program is to
contribution toward alleviating the shortage of trained personnel
ical education for handicapped persons. The program also serves
ain physical educators for new roles in public school systems and
mental and rehabilitation settings. The program focuses upon the
e physical educator as part of the comprehensive treatment team;
re a multidisciplinary approach is emphasized.

ducation

gram of study in the field of adult education prepares students for
s in educational institutions, voluntary organizations, and other
ons in the private or public sectors which sponsor adult learning
s. The students enrolled in this program obtain the skills and un-
dings required to perform functions associated with the roles
ning specialist, administrator, counselor, and consultant in the
adult education.

Student Development

ter's degree program in college student development provides the
c, professional, and philosophical preparation for entry-level
s in the field of student affairs. The program provides education
nistration, counseling, group facilitation, leadership training, and
tional development. Many graduates are employed in colleges
versities in the areas of career development, international student
residence hall programming, financial aid, student affairs research,
ctivities, admissions, and counseling.

Curriculum

The master's degree program in curriculum has been developed educators in meeting state licensing requirements for school admi and supervision. Courses cover a broad range of theory and pr are appropriate for non-school-based agencies and for educa cerned with program or learning media development.

Dance

The master's degree program in dance is designed to prepa specialists for roles in the areas of choreography, dance therap education, or performance. The student plans with the advisor of study that considers individual background, professional inter career goals.

Early Childhood Education

The master's degree program in early childhood education teachers, directors, and supervisors in nursery schools, day care and kindergartens, as well as researchers and program specialis field.

Elementary Education

The master's degree program in elementary education is planne teachers continue their professional growth and advance in co in their work in regular elementary school classrooms. The prog be used to develop an academic specialization for work with e school children, or to explore fields of specialization for present professional goals.

Elementary/Secondary Administration

The graduate program in educational administration is designe pare students for leadership roles in public and private e organizations. The master's degree program in elementary and administration is considered to provide the minimum entry-leve tion for the positions of principal, assistant principal, and head ment.

General Physical Education

This program permits students to take courses in allied areas and fields to enhance their ability to compete for more varied emp opportunities in general physical education. The electives are by the student in consultation with the advisor and are based ground and professional goals.

Generic Counseling

The generic counseling program prepares individuals to do v educational, or personal counseling in community or gov agencies.

ance and Counseling

guidance and counseling program prepares individuals to be certified rk as counselors in elementary or secondary schools.

er Education

higher education program affords the student a concentration in nistration, teaching, or curriculum. Courses prepare students for nistrative positions in areas generally encompassing college and uni- ty organizations: academic affairs, public relations, finance, and de- ment.

an Resource Development

program of study in the field of human resource development is ned for persons either entering or advancing in positions associated training, education, and development activities in business, industry, rnment, and other large organizations in the public or private sectors. program prepares students with the skills and understandings needed esponsibilities as learning specialists, administrators, and consultants is field.

idualized Master of Arts

program permits development of individualized programs which cut s existing fields, both within the School of Education and Human lopment and between Education and other schools and departments e University and Consortium. The program is designed to meet specific ssional objectives of applicants with unique needs. It will be possible late independent study, special workshops, international experiences, a thesis to identified objectives. There must be a balance between lational and specialty preparation and between theoretical and ical experiences.

ptual-Motor Development

purpose of this program is to assist the student in developing the y to observe performance, analyze tasks, assess developmental level, ribe appropriate activities, and apply appropriate learning strategies. uates are now working as motor development specialists and team ers in special education settings, resource personnel for mainstream- urriculum specialists in movement education and perceptual-motor opment, and activity coordinators in public and private day care s.

ng

ers who have completed this program have been employed in various l systems, as special reading teachers, reading clinicians, reading ltants, or reading supervisors. Persons who complete the program urses selected from it) will be more attracive candidates for regular oom teaching positions, in addition to being more effective teachers.

Rehabilitation Counseling

This program prepares individuals to provide vocation
psychosocial services to people confronted by problems
tional, intellectual, or social disabilities. Employment
trained counselors exist in state vocational rehabilitat
community agencies such as sheltered workshops, reha
and mental health settings. The rehabilitation counselor
as a counselor but also as a coordinator of services pro

Secondary Education

This program is designed primarily for junior and sen
teachers who wish to further develop their skills and
teaching. The program is also useful to those interested i
secondary schooling in the United States.

Special Education

Early Childhood Special Education

The early childhood special education program consists
hours of graduate credit designed to bring students insight
in the areas of the development of young exceptional child
ping conditions of early childhood; identification and as
cedures in early childhood special education; clinical teachi
mentally disabled young children; and alternative mode
to the developmentally disabled young child. This two-pro
prepares teachers of developmentally disabled young child
service role), and early childhood special education strategi
tant role). Admission requirements differ for each role. Eligi
program is best determined by a personal interview with
staff.

Vocational/Special Education Program

This program is designed to provide trained personnel to assis
capped to become self-sufficient in an increasingly complex
emphasis of the program has been placed on career training
assist the handicapped person to obtain a constructive p
working community. The student receives intensive training in
individual educational planning, pre-vocational education, supp
tional education, academic programs, and community pla
graduate of this program will be prepared to be either a *class*
teacher in a secondary-level school, serving as a work-study
or special education classroom teacher, or a *school-based resou*

Supervision and Human Relations

The program in supervision and human relations prepares p
administrative and supervisory positions in public and private
school districts. The program is designed to lead toward li
administrative and supervisory positions in nearby states. Ba

general supervisory principles and responsibilities, and will also erest to educators in non-school agencies.

tic Recreation

gram prepares students for positions in therapeutic recreation in , institutions, day care centers, geriatric facilities, community n departments, and other facilities which provide services to populations. At least seven roles have been identified in the herapeutic recreation: these include therapist, counselor, educa- rvisor, administrator, researcher, and consultant.

Development and Travel Administration

gram has an emphasis that is international in scope; it is con- with public travel and tourism offices, convention and visitor , research and planning firms, financial institutions, tour whole- travel agencies, educational institutions, and corporations in- n travel and tourism. The program is intended for those concerned eveloping competencies needed for advancement in tourism and organizations, and with preparing entry-level professionals for ent. Graduates are now employed by travel-related businesses, and universities, national tourism agencies, resorts, and in other ourism organizations.

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eachers interested in developing or strengthening their academic tence, the Master's programs in elementary and secondary education ly permit 15 to 18 semester hours of work in departments other than ion. These programs are designed to meet the need of teachers-in- who need additional work in content to qualify for advanced certifi- or to improve their classroom skills and may also be helpful to usly trained teachers planning to re-enter the profession. The major asis is upon strengthening both the academic and professional com- cies of the teacher.

ditional information concerning these programs may be obtained by g or telephoning the office of the dean.

NCE REQUIREMENTS FOR THE MASTER OF ARTS IN EDUCATION

chelor's degree from an accredited institution, an undergraduate y-point index of 2.50 or above (C+ average), demonstrated interest ching, and personality traits that give promise of success as a er, are required. Students whose quality-point index is in the range to 2.49 will be considered for provisional admission. The quality index is computed on the basis of the last two years of the bache- legree program and on all course work completed beyond the bacca- te. In a number of programs there are more applicants than can be ed; therefore, selections by additional criteria are necessary. years of successful teaching are required before admission to can-

didacy in the field of school administration. Experience i
admission to programs in adult education and human reso
ment.

Candidates whose undergraduate preparation does not in
lents of the basic requirements for the degree of Bachelor o
cation must make up deficiencies and may be required to ta
tests.

ADVANCED STANDING

Advanced standing is granted for approved courses taken
credited institutions, but a minimum of 24 semester hours m
pleted at this University as a master's candidate.

A maximum of 12 semester hours of advanced courses
this University in excess of the requirements for the bachelor's
be credited toward the master's degree if the work fits in with
plan of specialization.

Advanced standing is not granted for work completed five o
before application for admission or readmission to master's ca

PLAN OF STUDY

The plan of study leading to the degree of Master of Arts i
requires a minimum of 33 hours of graduate credit. The plan
student's option, include a thesis carrying six hours of grad
Whether or not a student selects the thesis option, a minimum
must be from courses planned primarily for graduate stud
group courses). The 18 hours must include a course in resea
and procedures. A minimum of 12 hours, not including the
research course, must be from courses offered by the School
and Human Development.

Programs may include additional teaching-field preparati
cases, however, undergraduate and graduate courses combin
at least equivalent to the undergraduate requirements for th
Bachelor of Arts in Education.

Programs are planned initially in conference with an admis
in the School of Education and Human Development and subse
a designated advisor in the candidate's area of specialization
grams are based on the candidate's interests and backgroun
certification requirements of the state and locality in which
plans to teach.

All degree requirements must be completed within six years.

RESIDENCE

A candidate for the master's degree is required to complete
24 semester hours in residence.

SCHOLARSHIP

A quality-point index of 3.00 is required for graduation. Stud

he grade of *C* in more than six semester hours are subject to ion. Students who receive a grade of *F* must confer with the dean enrollment for further work.

ESIS

oice of the thesis subject must be approved in writing by the s advisor and filed in the office of the dean. A statement of the of Education and Human Development standards for the thesis and copies of detailed regulations regarding the form and reproduction hesis are available in the office of the dean.

ent of tuition for the thesis course entitles the candidate, during iod of registration, to the advice and direction of the member faculty under whom the thesis is to be written. In case a thesis ished, an additional calendar year may be granted without further payment. The student must, however, maintain continuous registra- ee page 49) during this period. If the preparation of the thesis beyond the additional calendar year, the student must register entire six hours of thesis again and pay tuition as for a repeated

'S COMPREHENSIVE EXAMINATION

tes in M.A. programs requiring 33 semester hours, may elect to additional three-semester-hour course approved by the academic in lieu of a comprehensive examination. Candidates in programs asic requirements exceed 36 semester hours may waive the com- ive examination with approval of the academic advisor. Candidates n to take the examination must be registered for the semester it taken and must file a written application in the office of the f Education and Human Development no later than 30 days prior ate of the examination.

GREE OF EDUCATION SPECIALIST

ram of advanced study leading to the degree of Education Spe- for students with master's degrees in education who seek further nal preparation for specific objectives.

on Specialist programs are available in the following fields:

ation
cation

Counseling
Curriculum
Higher Education

equirements

e of Master of Arts in Education from this University (or the , a satisfactory score on the Miller Analogies Test or the Record Examination, or grades in graduate course work which ards set by the Advanced Graduate Faculty, and two years of pertinent experience are required.

Each applicant must be interviewed and recommended by a st
of the School of Education and Human Development or by a rep
in the candidate's locality appointed by the dean.

Scholarship

Scholarship requirements for the degree of Education Speciali
same as those for the degree of Master of Arts in Education (
126–27).

Programs of Study and Degree Requirements

Individual programs are developed, through the faculty-advisor p
the candidate's skills, interests, and career goals. A minimu
semester hours beyond the requirements of the degree of Maste
in Education is required. At least 21 hours of this work must
on campus at this University; with the approval of the advisor, th
ing semester hours of the program may be taken in off-campus
of the GWU College of General Studies or at another approved u
A maximum of five calendar years is allowed for completio
program.

At least 12 of the required 30 hours must be in appropriate
courses in education selected from the following areas: (1) found
cognate study, (2) background and general principles of the field
(3) an area of specialization.

The Comprehensive Examination

Successful completion of a six-hour written examination and/or
examination, at the option of the major field advisor, is require

THE DEGREE OF DOCTOR OF EDUCATION

The School of Education and Human Development offers pro
advanced study leading to the degree of Doctor of Education. T
grams, which are under the supervision of the Advanced Graduat
provide major fields of study in teacher education, special
counseling, administration and curriculum, adult education, human
ment, human resource development, and higher education. Suppo
are available in administration, administration of higher educa
education, college student development, counseling, curriculum
tary education, higher education, human growth and developme
resource development, reading, secondary education, special
supervision, and teacher education. With the approval of the
Graduate Faculty and the departments concerned, one suppor
may be taken in other departments of the University. All program
study of interrelated areas of education and a doctoral dissertat
major field of study.

ion

plicant must have adequate preparation for advanced study, includ-duate work in fields prerequisite to his or her objective, equivalent required for the degree of Master of Arts in Education at this sity, at least three years of successful pertinent educational ex-e, acceptable personal qualities, and a capacity for creative scholar-d effective leadership.

applicant first arranges for an interview with the assistant dean ore the applicant's needs in relation to the resources of the School guide the student in applying for doctoral study. The required ures and standards will be explained at this time. Candidates meet-initial standards are admitted to precandidacy for the degree.

IDIDACY

precandidacy period a minimum of nine semester hours of course the program, including requirements specified by the Advanced e Faculty, must be completed. This work must be completed three semesters of admission to precandidacy, for part-time s, or within the first 18 semester hours of course work for full-dents. Application for full candidacy will then be decided on the the quality of scholarship in the precandidacy period, the recom-ons of instructors, a detailed plan for the balance of the program, ualifying examination.

Study

al, from two to three years of full-time study beyond the degree r of Arts in Education, or the equivalent in part-time study, are Programs are individually planned. It is estimated that, for the student, the work required for the total program will be 75 hours, including a minimum of 12 semester hours of dissertation

rogram is divided into two parts. The first consists of preparation rehensive examinations in a major field of study and two sup-elds, and completion of a required research tool field. The second sed of research investigation, the writing of a dissertation, and oral examination.

s who have completed the comprehensive examinations must or a minimum of six semester hours of *Dissertation Research*) per semester until 12 hours have been completed, and a mini-ree semester hours a semester thereafter until the satisfactory n of the final examination.

NSIVE EXAMINATIONS

ssion to doctoral candidacy the student is assigned to a com-h member of which is responsible for guiding the preparation the required comprehensive examinations in supporting fields

or the major field comprehensive examination. The candidate m
individual conferences with the committee members to de
content of each field and to receive guidance in preparati
examination.

The supporting field examinations, which are taken first, are
written examinations. In addition to the research tool field a s
plans a historical research investigation for the dissertation mu
an appropriate research seminar offered by the Department of H
student's dissertation committee may recommend other tool re
The tool requirement must be completed prior to the major fie
tion. The major field examination is a written 12-hour exami
hours on each of two successive days.

The candidate begins the second part of the program after
factory completion of all supporting field examinations, th
research tool field and the major field examination.

THE DISSERTATION

A dissertation is required as evidence of ability to perform s
search and to interpret and present its results.

During the first part of the program, the dean appoints a
committee, consisting of a chairperson (usually a major field a
two additional faculty members who serve as readers. The c
required to submit a proposal for the dissertation to this comm
determines its acceptability and recommends approval to the
on Advanced Graduate Studies. The dissertation is complete
guidance of the chairperson, with the advice of the other me
dissertation committee.

No later than the date specified in the calendar, the can
submit to the dean five complete copies of the dissertation and
of an abstract for inclusion in the announcement of the exam
for reproduction by University Microfilms, Inc. Printed copies
regulations regarding the form and reproduction of the dissert
aration of the abstract, and services offered by University Mic
are available in the office of the dean. The successful candi
doctorate is required, before receiving the degree, to pay a
the expense of printing the Announcement of the Final Examin
cover the basic service rendered by University Microfilms,
sign a microfilm agreement.

THE FINAL EXAMINATION

When the dissertation has approval of the director, the candida
mended to the dean for the final oral examination, which mus
at least three weeks before the degree is to be conferred. The
is open to the public and is conducted by a committee of
appointed by the dean, supplemented by at least two leaders
date's field of study from outside the University. Candidates w
fully pass the oral examination are recommended for the de
faculty of the School of Education and Human Development.

nce and Continuous Study

preparation for the degree, including examinations, courses, semi- nd other work done under the direction of an advisor, must be done dence. The student must remain registered in the School of Educa- nd Human Development, except when the dean or the Advanced ate Faculty has granted a leave of absence. Failure to register each er of the academic year may result in lapse of candidacy. Subse- readmission is subject to whatever new conditions and regulations een established by the Advanced Graduate Faculty.

supporting and major field examinations must be completed within ars of the date of admission, and the entire program must be ted within eight years, regardless of full-time or part-time study. ndidates must satisfy one of three options for full-time study. In- ion concerning these plans will be provided by the assistant dean equest by the candidate.

AL PROGRAMS AND SERVICES

ion of Teachers of Exceptional Children

hool of Education and Human Development offers a program for the on of teachers of exceptional children. Laboratory experiences are d in schools for handicapped children in the metropolitan area. s are accepted at the junior- or senior-year undergraduate, master's, on specialist, and doctoral levels. By special permission, teachers, administrators, and adequately prepared students from other and colleges of the University may elect these courses. Inquiries ing the program and the availability of scholarships and fellow- ould be directed to Dr. Perry Botwin, Department of Special Edu- George Washington University, Washington, D.C. 20052.

e Program in Rehabilitation Counseling

erally funded master's degree program trains rehabilitation coun- assist those who are disabled or disadvantaged to assume a place y. The two-year program combines fieldwork and coursework in g students for employment in an expanding field that yields high arian rewards. Both the profession and the program are inter- ary, drawing upon such related areas as guidance, medicine, psy- social work, sociology, and special education.

es concerning the program, the availability of traineeships for students and applications should be directed to Dr. Daniel Sinick, ation Counselor Education, George Washington University, Wash- C. 20052.

Specialization in Therapeutic Recreation tive Physical Education

ter's degree program in the field of physical education, with a tion in therapeutic recreation or adaptive physical education, is the Bureau of Education for the Handicapped, U.S. Office of

Education. Both programs require an intensive internship (mini
clock hours) in University-affiliated training centers in Wash
hospitals, schools, clinics, and public agencies. Inquiries conc
program and the availability of graduate research assistantsh
ternships should be directed to the Chairman, Department
Kinetics and Leisure Studies, George Washington University, W
D.C. 20052.

Certification Curricula

The School of Education and Human Development provides
planned programs for liberal arts graduates with appropriate d
accredited institutions who wish to prepare for teaching. Th
certification, but not wishing to work for a degree, may enro
fication program if they meet the admission, scholarship, and
requirements of degree candidates. The School also provides
of courses of interest to teachers who wish to renew license

Reading Center

(See pages 54–55)

Speech and Hearing Clinic

(See page 54)

Off-Campus Degree Programs

The School of Education and Human Development has acad
tion over the off-campus programs leading to the degree of M
in Education in the fields of elementary education; generi
guidance and counseling; higher education; human resource
secondary education; special education—early childhood spec
and supervision and human relations. The degree of Educat
is offered in administration and higher education.

These degree programs are administered by the Colleg
Studies. For details concerning the off-campus programs s
of General Studies Bulletin.




THE
GEORGE WASHINGTON UNIVERSITY

OOL OF GOVERNMENT AND BUSINESS INISTRATION

P.B. Vaill
iate Dean H.R. Page
ant Deans K.J. Darr, J. Lobuts, Jr.

LTY*

ssors F. Amling, F. Belaunde-Terry *(Visiting)*, G. Black, D.S. Brown, Burdetsky, K.J. Darr, M.C. Devolites, R.B. Eastin, A. El-Ansary, R.F. son, L. Gintzig, P.D. Grub, J. Harvey, W.J. Keegan, F.C. Kurtz, G.P. ter, E.J.B. Lewis, G.L. Lippitt, N.M. Loeser, A.J. Mastro, D.C. Mcth, Jr., H.R. Page, P.N. Reeves, D.D. Roman, E. Timbers, P.B. Vaill, wick

ct Professor F. Gutheim
iate Professors E.B. Adams, P.S. Birnbaum, B.L. Catron, S.R. Chitod, J.P. Coyne, H.J. Davis, S.F. Divita, R.F. Dyer, R. Eldridge, E.H. man, S.S. Fuller, M.G. Gallagher, S. Greene, W.C. Handorf, W.W. dgrave, M.M. Harmon, R.L. Holland, J.F. McCarthy, Jr., A.E. Merget, Paik, E.B. Peters *(Visiting)*, D.O. Porter, T.E. Shaughnessy, S.N. rman, R.G. Shouldice, W.E. Smith, E.K. Winslow
ct Associate Professors H.C. Demoody, W.J. Green, Jr., J. Lobuts, Jr.
ant Professors W.C. Adam *(Visiting)*, G. Bodnar, D. Gale, E.W. Hahn, McHugh, J.M. Sachlis, S. Umpleby, C.W. Washington, P. Welling, Yang *(Research)*
ct Assistant Professors E.M. Bryant, Jr., S.T. Fisher, J.J. Geer, C.V. rdon, D.C. Novak, N.G. Oglesby
ctors D.F. Bergwall, C.P. McKelvey
ct Instructors R.W. Black, J.E. Bruhn, M.S. Duny, G.E. Farrelly, R.A. ton, W.L. Roach, Jr., D.R. Sheldon

nittees†

S COUNCIL

oyne, S. Greene, W.C. Handorf, G.J. McHugh, C. Paik, C.W. Washing-

ITTEE ON CURRICULUM AND PROGRAMS

Page, D.S. Brown, M.C. Devolites, E.H. Forman, D.E. Gale, M.G. her, W.J. Keegan

—

resident of the University, the Vice President for Academic Affairs, the Registrar of the ty, the Director of Admissions of the University, and the University Librarian are *ex* embers of the Faculty of the School of Government and Business Administration.
ean of the School is an *ex officio* member of all committees.

COMMITTEE ON DOCTORAL STUDIES IN BUSINESS ADMINISTRATION
PUBLIC ADMINISTRATION

G.P. Lauter, S.R. Chitwood, S.S. Fuller, W.W. Hardgrave, A
P.N. Reeves, J.M. Sachlis

INTRODUCTION

This School was organized as the School of Government in 19
the next two decades, programs in business administration and
ministration were added, and the emphasis gradually shifted f
graduate to graduate study. The name was changed in 1960 to
of Government, Business, and International Affairs to reflec
curately the offerings of the School. A division of the School w
in 1966, and two schools were established—the School of Gove
Business Administration, a primarily professionally oriented
the School of Public and International Affairs, a primarily poli
school.

Objectives

The objectives of the School are:

1. to prepare graduates for positions in the management
organizations in both business and government;
2. to emphasize a broad fundamental education as the best
for positions carrying management or administrative respons
3. to explore in all their forms, through education and r
interactions and interdependencies of institutions in the
private sectors, both nationally and internationally;
4. to extend the School's resources and influence into the
that is, to business, educational, health, and governmental insti
environment whose missions and needs can benefit from a
School's resources.

Programs in the School include examination of administrati
and quantitative approaches to decision-making common to b
and government. These programs stress the points at which
decisions of either business or government must give consid
lated policy decisions of the other. Emphasis is placed on
management education is not limited to organizational techn
in the broadest sense, education for management responsibi

It is the policy of the School to emphasize a broad fundam
tion as the best preparation for positions carrying managem
trative responsibility.

Undergraduate programs concentrate the first two years in
eral arts curriculum drawn fom the social sciences, humanit
tive methods, and a limited number of courses in administrat
in the junior and senior years expand their work to include
tions of business enterprise, (2) the economic and legal
business, (3) the implications of modern analytical techni
quantitative methods, (4) the study of organization theory
relations, and (5) the practice of problem-solving techniques

uate programs develop the elements common to all management
ns regardless of the nature of the operation. Master's degree pro-
are based on study of the principles of management, human rela-
nd problem-solving plus an area of specialization.
student body is comprised of both full- and part-time students,
necessitates the scheduling of classes both during the day and in
gs after normal working hours. All students should anticipate some
classes. The presence of working students is viewed as an en-
nt of the evening class sessions.
onsive to the needs of the Washington community, the School has
d the policy of making many of its educational activities available
campus centers in the metropolitan area. The School is offering
elor of Science in Health Care Administration degree, at this time
to students at the Naval School of Hospital Administration, Be-
Md. The Bachelor of Business Administration, Master of Arts
th Care Administration, Master of Business Administration, Master
ic Administration, and Master of Urban and Regional Planning
are offered on campus, while the Master of Science in Administra-
gree is the only graduate degree offered off campus. The off-campus
ns have strong support in the area and provide significant contact
e business and government communities. Programs of study leading
degree of Master of Science in Administration are listed in the
of General Studies Bulletin.

ic Status

hool of Government and Business Administration has maintained
nbership in the Middle Atlantic Association of Colleges of Business
stration since 1961. It joined the Council on Graduate Education
lic Administration in 1966. In 1968, the School became a member
American Assembly of Collegiate Schools of Business, and the
aduate programs are accredited by the Assembly. The programs
unting satisfy the educational requirements for the Certified Public
tant and Certified Management Accountant professional examina-
The program in hospital administration is accredited by the
ting Commission on Education for Health Services Administration.
ster of Urban and Regional Planning degree program is recognized
American Institute of Planners.

n Body of Knowledge

s leading to the degrees of Bachelor of Business Administration
ster of Business Administration include the equivalent of at least
r of work in the following areas:
ackground of the concepts, processes, and institutions in the pro-
and marketing of goods and/or services and the financing of the
enterprise or other forms of organization;
ackground of the economic and legal environment as it pertains to
nd/or nonprofit organizations, along with ethical considerations
al and political influences as they affect such organizations;

3. a basic understanding of the concepts and applications of
quantitative methods, and information systems;
4. a study of organization theory, behavior, and interpersonal
cations;
5. a study of administrative processes under conditions of
including integrating analysis and policy determination of
management level.

Fellowships

The School of Government and Business Administration
graduate fellowships available to its students, including the
Research Fellowships in International Business, Health Care
tion Fellowships, Ernst and Ernst Grant to Doctoral Candidates
or Economics, the National Association of Purchasing Manage
ship, the Scottish Rite Foundation Fellowships and the Wolco
tion Scholarships.

REGULATIONS

Regulations concerning admission, registration, fees and fi
stated on pages 20–34, other University regulations, on pages

Attendance

A student may not attend classes until registration is comple
due are paid. A student may be dropped from any course
absence.

The student is held responsible for all the work of the cours
registered, and all absences must be excused by the instructo
before provision is made for the student to make up the wor

A student suspended for any cause may not attend classes
period of suspension.

Withdrawal

Withdrawal from a course or from the University without acade
is permitted during the first four weeks after registration for
spring semester. Withdrawal after this period is permitted only
circumstances, and requires certification by the instructors of
which the student is registered that the student is doing passing
"Withdrawal," page 47).

Adding Courses

Courses may not be added after the first full week of cla
semester or summer session.

Independent Study Plan

A student of *demonstrated capacity*, with a special interest in
matter of a course, may be permitted to undertake study un

direction of an instructor, in accordance with the rules of the riate department. Credit under this plan is limited to the specific credits normally allowed when taken on a class basis.

Correct English

tudent whose written or spoken English in any course is unsatisfac- ay be reported by the instructor to the dean. The dean may assign mentary work, without academic credit, varying in amount with the of the student. If the work prescribed is equivalent to a course, the tuition fee is charged. The granting of a degree may be delayed lure to make up such deficiency in English to the satisfaction of the

BACHELOR OF BUSINESS ADMINISTRATION DEGREE

chool offers programs leading to the degree of Bachelor of Business istration in the fields of accounting and business administration.

ANCE REQUIREMENTS

character and an academic background appropriate for the program dies contemplated are required.

uirements for admission to the freshman class are as follows:

1. An acceptable certificate of graduation from a U.S. secondary showing at least 15 units* which must include four years of ; at least two years of one foreign language; two years of science, bly with laboratory instruction; two years of social studies, one ch must be American history; and two years of college preparatory natics. An applicant whose high school record is deficient in any se units cannot be admitted until such deficiencies are removed by appropriate courses or examinations.

rnational students may be considered for admission with an equiva- reign secondary certificate. A student presenting such a certificate lso show competence in the English language by scoring not less 50 on the first taking of the TOEFL or 600 on the second taking. tional students may be required to enroll in a full-time program lish before beginning studies in a degree program.

ollege Entrance Examination Board scores submitted on the Scho- Aptitude Test and the English Composition Achievement Test. recommended that the examinations be taken in December or y. Scores on tests taken in the junior year may be submitted. Ar- ents for tests are the responsibility of the applicant and should be with the Educational Testing Service, 20 Nassau St., Princeton, N.J. or 1947 Center St., Berkeley, Calif. 94704, not less than one month

represents a year's study in a secondary school subject, including in the aggregate not 120 sixty-minute periods, or the equivalent, of prepared classroom work.

before the date of the test. In applying for the test, the applic
specify that the scores be sent to the Office of Admissions, Ge
ington University, Washington, D.C. 20052.

The College Entrance Examination Board tests are preferre
the American College Testing battery scores will be accepted
cant should request that these scores be sent to the Office of
directly from the American College Testing Program, Iowa
It is recommended that the applicant take the tests in Oct
senior year.

The School of Government and Business Administration w
the adequacy of the qualifications of an applicant who, because
circumstances, does not present all of the formal requirem
above. The School may prescribe appropriate scholastic-aptit
the University.

(B) Students who have been out of secondary school for thr
more and/or have not taken the CEEB or ACT may take a
tery of admission tests* by contacting the Office of Admissi
be considered for admission to the School of Government an
Administration on a conditional basis. To be admitted into t
degree program, a conditionally admitted student must com
program of 15 semester hours of course work with a quality-
of 2.5 or higher. This trial program must include one course
counting, economics, English, and science, to be selected from t
curriculum of the Bachelor of Business Administration degree p

The selection of courses to be taken in the trial program m
in conference with a faculty advisor in the School of Gove
Business Administration. A conference concerning plans for
degree candidate is required of each applicant at the beginni
of the trial program. Upon successful completion of the trial p
student who has submitted a degree-candidate application will b
to degree status.

Admission with Advanced Standing

Requirements for admission of students transferring from othe
accredited colleges and universities and from other divisi
University, are as follows:

(A) Students who have accumulated 30 hours or more
credit at another regionally accredited college or university in
earned a 2.00 or higher quality-point index may be admitted t
of Government and Business Administration. Advanced stan
awarded for properly certified courses taken at regionally ac
leges or universities for which the student received a grade o
and may be applied toward a degree provided they are co
the curricular requirements of the degree.

In no case will more than 60 semester hours of advanced
granted for course work completed at regionally accredite
or junior colleges. Accounting and business administration cou
such colleges may be applied toward the Bachelor of Business

* These tests include, among others, the Differential Aptitude Test, Cooperative
nation and Ohio Psychological Test.

ree provided they are comparable to BAd 161, Mgt 118, 119, or Stat
r courses (one course per area up to a maximum of three courses),
able to this School's courses numbered 101-200, taken at an ac-
community or junior college where a grade of *C* or better has
rned may be accepted to waive certain required courses. The
of a required course does not entitle the student to any semester
f credit.

ugh a grade of *D* is not acceptable for transfer, the course may be
satisfy a curricular requirement. Credits earned with a *D* grade
, however, be counted toward the total number of semester hours
for the degree. Any course completed with a grade of *D* or better
be repeated for the purpose of earning degree credit.*
School reserves the right to refuse credit for transfer in whole or
or to allow credit provisionally.
he responsibility of the student to have an official transcript sent
from each institution formerly attended to the Office of Admis-
eorge Washington University, Washington, D.C. 20052.
udents may transfer into a degree program in the School of Gov-
and Business Administration after completing at least 12 or more
r hours in another degree-granting division of this University pro-
e student has an accumulated quality-point index of 2.00 or higher
me of transfer. A student wishing to transfer into the School from
division of this University must submit a formal application of
to the Office of Admissions.
es taken at another division of this University may be applied
a degree in this School provided they are comparable to the
ar requirements of the degree. A maximum of 90 semester hours of
credit may be applied toward a degree program in this School.
case will credit for more than 15 semester hours of undergraduate
work taken at this University in nondegree status be allowed
meeting degree requirements in the School of Government and
Administration.

sion

nt who withdraws, is suspended or is otherwise absent from the
ty for one semester or more must make formal application for
sion. If readmitted, the student is subject to the rules and regula-
force at the time of return. If the student has attended one or
ionally accredited colleges or universities during absence from the
ty, complete official transcripts must be sent to the Office of Ad-
from each institution attended.
plication fee is waived for a student applying for readmission who
stered as a degree candidate at the time of last registration at the
ty and who has not since registered at another college or uni-

tion to this rule is the freshman English composition requirement. Any student earn-
lower than C in English composition at another institution may be required to repeat
s) at this University.

REQUIREMENTS FOR THE DEGREE

Academic Work Load

A full-time student not on probation may not ordinarily take
15 semester hours. A student employed more than 24 hours a
is not on probation, may not take more than nine semester hours.

A full-time student whose overall quality-point index is 3.5
may take up to 18 semester hours. A student employed more th
a week, whose index is 3.50 or higher, may take up to 12 seme

A student who accepts employment after registration or
during a semester must report immediately to the Dean, so that
may be adjusted if necessary.

Exception to these rules will require the approval of the De

An undergraduate student on probation may take no mo
semester hours of course work.

Scholarship Requirements

To graduate, a student must have the following: (1) a general q
index of at least 2.00 and (2) a quality-point index in the major
2.00. All courses in the Bachelor of Business Administration de
or option are to be included in the quality-point index calculati
courses in or out of the School of Government and Business Adm
cannot be used as substitutes in the major quality-point index c

DEAN'S HONOR LIST

The names of students who achieve a quality-point index of 3.5
are placed on the Dean's Honor List for that semester. Appeara
list will be limited to (1) full-time students registered for a min
semester hours and (2) part-time students registered for a min
semester hours over a period of two consecutive semesters.
include a summer term.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or W
Withdrawal) may be assigned are described on page 46.

The grade of *I* must be removed no later than the last
examination period for the fall or spring semester immediate
the semester or summer session in which the grade of *I* is
"Incomplete" that is not removed within this period is
changed to an *F*. In cases of well-documented extenuating
an instructor and a student may jointly petition the dean,
priate committee, for additional time in which to complete
the course. Such petitions should be submitted within the
The grade of *I* cannot be removed by reregistering for the
by taking its equivalent elsewhere.

TION

ent whose cumulative quality-point index falls below 2.00 after ting a minimum of 12 semester hours of study will be placed on on. This probation extends over the period in which the student s 12 semester hours of work, which may include remedial studies cribed.

SION

nt whose quality-point index is 1.50 or below or whose index re- below 2.00 at the end of the probationary period may be suspended. nt suspended for poor scholarship may apply for readmission after se of either the fall or spring semester. To be considered for re- on, the student must pass prescribed tests and submit evidence to n's Council of conduct during absence from the University which s that the student will profit from readmission. A student read- after suspension is on probation and must maintain a current point index of at least 2.50 on each 12 semester hours of work ken until the cumulative index is 2.00. In no case will the pro- ry period after readmission exceed 24 hours of study. A student ed twice for poor scholarship will not be readmitted.

NO CREDIT OPTION

r or senior student who has a cumulative quality-point index of better, may, with the approval of the advisor and the dean, take rse a semester and receive a grade of CR, Credit, or NC, No Credit, will be recorded on the student's transcript but will not be reflected quality-point index. No student will be allowed to take more than edit/no credit courses. A student must sign up for such an op- registration. Under no circumstances may a student change from o credit status to graded status, or vice versa, after the end of tion. Courses required in the student's major field may not be n the credit/no credit basis. A transfer student may not choose ion until the second semester of enrollment in the University.

ce

num of 30 semester hours, including at least 12 hours in the major ust be completed while registered in the School of Government siness Administration. This requirement applies to students trans- within the University, as well as to students transferring from other ons. Unless special permission is granted by the dean to pursue sewhere, the work of the senior or final year must be completed School of Government and Business Administration.

ondence and Home-Study Courses

or correspondence or home-study courses is not acceptable and be applied toward a degree in the School of Government and s Administration.

Earning Credit or Waiving Requirements by Examination

A student may earn credit up to a maximum of 30 semester
waive curricular requirements by performing satisfactorily on the
tests:

College-Level Examination Program (CLEP)—See pages 22-23 fo
information on the CLEP tests. CLEP tests in Introductory Accou
troduction to Business, Commercial Law, and Data Processing a
to three credits each of advanced standing. All other CLEP te
counting and business administration (School of Government and
Administration courses) are not accepted for advanced standing
enrolled in George Washington University who wish to receive
CLEP Subject Examinations must receive prior approval of the de

Advanced Placement Tests—See page 22.

Achievement Tests—See pages 23–24.

Examinations for Waiving Curriculum Requirements—The S
Government and Business Administration does not administe
examinations. However, certain arts and sciences courses may be
and in some instances credit may be assigned, by satisfactorily
special departmental examination authorized and prescribed by
partment or curricular advisor concerned. Requests to take the
tion should be made to the curricular advisor and the required
at the Office of the Cashier before the date set for the examina
pages 76–77 for more information.

CURRICULUM REQUIREMENTS

One hundred and twenty semester hours of course work are req
graduation. To be recommended by the Faculty for graduation, ca
are required to complete, in addition to the appropriate freshm
sophomore work, a minimum of 60 semester hours (second-grou
work) in the junior and senior years selected from one of the tw
field curricula offered by the School.

Curriculum for the First Two Years in Accounting and Business Administration

FRESHMAN YEAR

Acct:	Acct 1–2	
Econ:	Econ 1–2	
Engl:	Engl 9 or 10, 11	
Science:	BISc 3–4 or 11–12; Chem 3–4 or 11–12; Geog 51 52; Geol 1–2; or Phys 1 and 2, 3 and 4, or 9–10	
*Elective:	Courses other than in accounting, business ministration or economics	
	Total	

* Courses in human kinetics and leisure studies may not be taken for credit.

MORE YEAR

BAd:	BAd 51	3
lumanities:	Art 31–32 or 71–72; Chin 3–4; Engl 51–52, 71–72, or 191 92; Fren 3–4 or 6, or 51–52; Germ 3–4 or 51–52; Ital 3–4; Mus 3 and 4; Phil 50, 71; Rel 9–10, 21, 22, 23, 59, 60; Slav 3–4, 5–6, or 91–92; Span 3–4 or 6, or 51–52; or SpDr 1 and 11, or 11 and 111 (Accounting majors may postpone this requirement until the junior year if they wish to take Acct 121 or 191 in the sophomore year)	6
Math:	Math 31 and 32, or 51 and 52	6
lal Studies:	Psyc 1, 8	6
	AmCv 71–72; Anth 1–2; Hist 71–72; PSc 1 and 3 or 2 and 3; or Soc 1 and 2	6
Stat:	Stat 51	3
	Total	30

nting Major

YEAR

Acct 101:	Cost and Budgetary Control	3
*Acct 121:	Intermediate Accounting	3
Acct 161:	Federal Income Taxation	3
*Acct 191:	Advanced Accounting	3
BAd 102:	Fundamentals of Management	3
BAd 131:	Business Finance	3
BAd 141:	Basic Marketing Management	3
BAd 161:	Commercial Law	3
Mgt 118:	Introduction to Information Processing	3
Elective:	Selected from courses other than in accounting, business administration or economics	3
	Total	30

YEAR

Acct 132:	Accounting Theory	3
Acct 171:	Auditing	3
Acct 181:	Accounting Systems	3
BAd 101:	The Business Environment	3
BAd 181:	Manufacturing Production	3
BAd 198:	Business Policy and Administration	3
Econ 121:	Money and Banking	3
Statistics:	Three semester hours selected from the following:	3
Stat 103:	Statistics in Business	
Stat 187:	Theory of Sampling	
Elective:	Three semester hours selected from courses in accounting,† business administration, or economics, and three semester hours selected from courses in other departments	6
	Total	30

21 and 191 are elected in the sophomore year, students replace this requirement with er hours of humanities (see above).

students accepted in the accounting internship program will elect Acct 199 in place emester hours of electives selected from courses in accounting, business administra- nomics.

ACCOUNTING PRACTICE INTERNSHIP

An internship program, limited to selected senior accou
available during the semester break of the senior year.
to this program students must have the approval of the
Department of Accounting and must have completed at le
hours of accounting courses (including a course in auditi
or higher average and an over-all grade of 2.50 by the
semester. Students will be paid a salary while conducti
senior supervision of participating C.P.A. firms. Other
industry and government are available. Students who
internship successfully will register for Acct 199 the spri
their senior year and will receive three semester hours
further information consult the chairman of the Department

Business Administration Major

The program in business administration is designed to pr
foundation required for eventual leadership in either g
business administration. It consists of the 36 semester h
courses; 15 hours in one of the following group options;
of electives, normally advanced courses in liberal arts su

JUNIOR YEAR

Acct 193:	Business Budgeting
BAd 102:	Fundamentals of Management
BAd 105:	Personnel Management
BAd 131:	Business Finance
BAd 141:	Basic Marketing Management
Mgt 118:	Introduction to Information Processing
Group Option:	Six semester hours selected from the cho specialization (see below)
Elective:	To be selected in consultation with the ad
	Total

SENIOR YEAR

BAd 101:	The Business Environment
BAd 161:	Commercial Law
BAd 181:	Manufacturing Production
*BAd 198:	Business Policy and Administration
Econ 121:	Money and Banking
Psyc 144:	Personnel and Industrial Psychology
Group Option:	Nine semester hours selected from the of specialization
Elective:	To be selected in consultation with the
	Total

* International business majors must complete BAd 178, *International Bus*
tions, in lieu of BAd 198.

IONS

as of specialization are open to business administration majors. urs taken in each of these options require the approval of the he group option and the individual courses within the option selected *at the beginning of the junior year*. The student should e chairman of the Department of Business Administration for of an advisor.

conomics

ng courses provide the basic academic foundation for such positions economic analyst, industrial economic analyst, and market research usiness and government.

Ad 132: International Business Finance
Ad 133: Capital Formation
Ad 176: International Business Theory and Policy
on 101: Intermediate Microeconomic Theory
on 102: Intermediate Macroeconomic Theory
on 158: Industrial Organization
31, 162: Public Finance I, II
181–82: International Economics
11, 112: Business and Economic Statistics I, II

Finance

ng courses provide the basic academic foundation for such positions alyst, supervisor in a financial institution, bond cashier, trust officer, iner and similar positions in federal or international financial

ct 111: Financial Statement Analysis
ct 121: Intermediate Accounting
d 113: Real Estate
d 121: Fundamentals of Insurance and Risk Management
d 132: International Business Finance
d 133: Capital Formation
d 138: Investment and Portfolio Management
n 101: Intermediate Microeconomic Theory

Information Processing

g courses provide the basic academic foundation for positions in processing in government, business, and industry. They also give an understanding of the manager's use of information processing anagerial technique.

t 119: Computer Programming for Information Systems
t 120: Information Systems Development I
t 121: Information Systems Development II
t 122: Special Studies in Information Systems

al three-credit course, approved by the advisor, is required.

his group option.

Group IV: International Business

The following courses provide the basic academic foundation f international business, both in private industry and in governm this option who have received credit for two years of a mode guage, or the equivalent, are required to take only 12 semester following courses.

*BAd 132:	International Business Finance
*BAd 144:	International Marketing Management
BAd 147:	Advertising
BAd 171:	Principles of Transportation
*BAd 175:	Introduction to International Business
BAd 176:	International Business Theory and Policy
Econ 181–82:	International Economics

Group V: Marketing

The following courses provide the basic academic foundation fo as sales manager, marketing manager, product development m director, buyer, advertising director, sales promotion manag manager.

*BAd 143:	Marketing Research
BAd 144:	International Marketing Management
BAd 145:	Sales Management
BAd 147:	Advertising
BAd 158:	Physical Distribution Management
BAd 171:	Principles of Transportation
BAd 175:	Introduction to International Business
BAd 176:	International Business Policy and Operati
Jour 145:	Principles and Problems of Public Relatio
Stat 111, 112:	Business and Economic Statistics I, II

Group VI: Personnel Management

The following courses provide the basic academic foundation fo as personnel manager, employee relations manager, and emplo in business and government service.

*BAd 106:	Leadership in Personnel Management
*BAd 107:	Collective Bargaining
Jour 145:	Principles and Problems of Public Relatio
Psyc 129:	Theories of Personality
Psyc 131:	Psychological Tests
SpDr 121:	Group Discussion and Conference Leader

THE MASTER'S DEGREES

Master of Business Administration—The degree of Ma Administration is this School's principal professional degree is designed to develop the analytical ability and perspe contribute to success as a responsible executive. Because ingly close relationship between government and business

* Required for this group option.

egree also provide an excellent background for many govern-
ers.

of Public Administration—The degree of Master of Public Ad-
n is primarily for those already in government service—federal,
l, intergovernmental, or international—or for those seeking
nt careers in government. The program provides students with
ation of the special requirements of public service, while at the
helping them to improve their own analytical and decisional
s. The degree is interdepartmental in nature, but the major em-
n the Department of Public Administration.

f Arts in Health Care Administration—This professional degree
l to prepare students with interdisciplinary training for pro-
ractice in administration and planning roles in public and pri-
organizations. Study may be made of various aspects of ad-
n of short-term hospitals, long-term health facilities (such as
are institutions, nursing homes, mental hospitals, facilities for
group practice clinics, health information systems, and health
encies.

f Urban and Regional Planning—This professional planning de-
gned as preparation for careers on the municipal, county, state,
l levels in both public service and private consulting practice.
m of study is planned to provide a broad education, to
mpetence in planning theory and methodology, and to em-
analytical ability and creativity necessary for solving urban
l problems.

f Science in Administration—The Master of Science in Ad-
degree is offered only off campus. It provides a course of
priate for those students currently working in government and
is a professional degree, preparing graduates for higher posi-
eater responsibility and generally improving their competence
rators.

REQUIREMENTS

idered for admission applicants must present the following
redentials: a bachelor's degree from a regionally accredited
niversity, including at least 90 semester hours of academic
n overall quality-point index of 2.50 (on a 4.00 scale) and a
east the 50th percentile on the applicable admission test.
whose undergraduate quality-point index is less than 2.50
mission test score ranks beneath the 50th percentile may be
f (1) the quality-point index multiplied by 200 and added to
n test score equals 950 points, or (2) the upper division under-
st two years of undergraduate work) quality-point index
y 200 and added to the admissions test score equals 1,000

for admission to programs leading to the degree of Master
Administration must submit acceptable scores on the Graduate
Admission Test; applicants for admission to programs lead-

ing to the degrees of Master of Arts in Health Care Administra
of Public Administration, and Master of Urban and Regio
must submit scores on the Graduate Management Admission
Graduate Record Examination. It is the responsibility of t
to make arrangements for the required test with the Educati
Service, Princeton, N.J. 08540. Correspondence concerning t
Management Admission Test should be addressed to Box 966
the Graduate Record Examination, to Box 955.

Waiver of the admission test may be requested, by letter, b
who meet the following criteria: (1) the undergraduate quality
exceeds 3.00, (2) the undergraduate degree was conferred n
five years previously, and (3) the undergraduate major was
which supports the graduate program for which the applicat
The Admissions Office will let the applicant know whether
waiver will be granted.

GENERAL REQUIREMENTS

All students must complete a minimum of 36 semester hours
course work. A maximum of one-quarter of the semester hours
course work required for a degree may be approved for tra
School of Government and Business Administration from the
General Studies, the Division of University Students, and
granting division of this University, or another accredited co
versity under the following conditions: the course work must
as part of the student's program of studies, it must not have
to the completion of requirements for another degree, it mu
graduate level, it must have been taken within the past tw
the student must have received a grade of *B* or better. This a
approved by a petition to the advisor and the dean. A tran
course work must be on file before the petition can be cons

Extended programs, including undergraduate background
be assigned for an applicant whose undergraduate degree w
other than the graduate program the student wishes to follo
undergraduate record indicates a weakness in required backgr

Master's degrees are awarded by vote of the Faculty on c
the required course work, an acceptable thesis (if one is e
quired) or the equivalent work, and the passing of the M
prehensive Examination if required in the chosen degree or

Second-group courses (numbered 101-200) may be counte
master's degree only when registration for graduate credit
proved at the time of registration by the dean and the curricu
No work counted toward a bachelor's degree may be cou
a master's degree.

Full-time students are normally expected to register for
semester hours each semester. A graduate student who is

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* Scores on the Miller Analogies Test are also accepted in place of the Gra
Admission Test or the Graduate Record Examination for admission to the
leading to the degrees of Master of Arts in Health Care Administration,
Administration, and certain concentrations in the degree of Master of Science

hours a week may not take more than six semester hours. All work
aster's degree *must be completed in five years, unless* an extension
is granted by the dean. Continuous registration does not serve
pose of extending a student's degree candidacy beyond the five-
he limit.

nts who expect to continue studies for the degree of Doctor of
s Administration or Doctor of Public Administration after re-
the master's degree should ask for assistance in planning programs
they may qualify for admission to candidacy for the doctorate.
redit is granted for work done *in absentia* or without formal in-
n, except for hospital residency, supervised field experience and
is, which may be completed *in absentia* with the permission of the
ent, curriculum advisor or committee concerned.

R'S COMPREHENSIVE EXAMINATION

Master's Comprehensive Examinations are required only in
degrees and fields of concentration. Degree candidates should
faculty advisors about examinations required and material to be
. In writing the examinations students are expected to correlate
as been learned in course work and from the literature of the
he examinations normally require four to eight hours. Sections
cover the various fields which the candidate has selected for
zation.

inations are scheduled three times a year, in late November or
ecember, April, and August, and should be taken during the last
r of course registration or shortly after completion of prescribed
work. If there is a lapse of time between completion of course
nd taking the examination, students must maintain continuous
ion and must be registered for the semester or summer session
the examination is taken.

tten application is filed with the department supervising the stu-
eld of study at the time of registration for the semester in which
nination is to be taken. Before applying, the student must have
ed all courses in the program or be enrolled in the last semester
t have achieved a 3.00 (*B*) average. After applying for the exami-
candidate may withdraw only by written notice to the depart-
airman.

didate who fails the examination should consult with the faculty
as to a subsequent course of action.

RSHIP REQUIREMENTS

or graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass;
, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.
rage of *B* or better is required for the master's degree. The grade
ot considered as failing but must be balanced by a grade of *A*
uate course of equal status.
ent whose quality-point index falls below 3.00 after completing a

minimum of 12 semester hours of study will be placed
This probation extends through the period in which the
attempts 12 semester hours of work, including prescribed co
this period the student's performance will be monitored
suitability for continued study. A student who is subject
for a second time is automatically suspended.

A master's degree candidate who receives a grade of *F*
present cause, for consideration by the dean, as to why co
should be permitted.

A master's degree candidate given the grade of *F* in a re
must repeat the course and achieve at least the grade of *B*.
does not expunge the grade of *F* and it remains part of
record.) Should this level of performance not be obtained, th
be denied further registration as a degree candidate.

SUSPENSION

A graduate student who does not meet the conditions of p
above) will be suspended or asked to withdraw. A student
pended or withdraws under these conditions may apply for
after the lapse of one semester. To be readmitted the studen
evidence which indicates academic success if readmitted
so readmitted will continue on academic probation and m
minimum quality-point index of 3.50 in the next 12 semes
graduate study. Should the student fail to achieve this min
point index a second suspension will result and subsequent
will be denied.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) or *W*
Withdrawal) may be assigned are described on page 46.

The grade of *I* must be removed no later than the la
examination period for the fall or spring semester immedi
the semester or summer session in which the grade of *I* wa
An "Incomplete" that is not removed within this period is
changed to an *F*. In cases of well-documented extenuating c
an instructor and a student may jointly petition the Dean,
priate committee, for additional time in which to complete th
course. Such petitions should be submitted within the same
grade of *I* cannot be removed by reregistering for the cours
taking its equivalent elsewhere.

Required Courses in Administration (Certain Fields)

The following courses in general administrative theory
required of all candidates for the degree of Master of Busines
tion.

		Semester Hours
Mgt 201:	Advanced Administrative Management	3
*Mgt 204:	Quantitative Factors in Administration	3
Mgt 207:	Human Behavior in Organizations	3

ition, each student is normally required to take, from the following he course appropriate to the selected area of concentration:

Acct 276:	Management Planning and Control	3
BAd 257:	Business Policy in the Multinational Firm	3
BAd 297:	Business Policy Formulation	3
HCA 206:	Case Studies in Health Care Administration	3
Mgt 263:	Case Studies and Field Research in GEMSOC	3

sis

contemplating doctoral study are strongly urged to include the a part of their master's program. The thesis subject should be as early as possible so as to permit effective integration with the ork.

bject must be approved by the professor in charge of the student's e thesis in its final form must have the approval of the professor and must be presented to the Dean by the student no later than announced in the calendar. Printed copies of detailed regulations the form and reproduction of the thesis are available in the the Dean.

nt of tuition for the thesis entitles the candidate, during the two s in which registered for thesis (299–300), to the advice and of the member of the Faculty under whom the thesis is to be In case a thesis is unfinished, an additional successive academic anted without further tuition payment. The student must, how- ntain continuous registration during this period. If the preparation sis extends more than three semesters beyond the date registered 300, the student must register for the entire six hours of thesis pay tuition as for a repeated course.

Master's Program Without a Thesis

s required in certain degree programs and optional in others. In grams where a thesis is optional and the student elects not to the student must take a course in research methodology and an

OF BUSINESS ADMINISTRATION

leading to the professional degree of Master of Business Ad- n include the following:†

Waived for students who select a concentration in Quantitative Analysis for ng.

iculum leading to the degree of Master of Business Administration with a field of fn Accounting, see pages 198-99.

1. *The recognized Common Body of Knowledge in business* tion.
This may be fulfilled by waiver for prior work completed or b pleting the courses listed below with a QPI of 3.00 or higher. A with an undergraduate degree in business administration from stitution accredited by the American Assembly of Collegiate of Business is regarded as having completed the Common Knowledge.

The Common Body of Knowledge Courses
Acct 201; BAd 230, 240; Econ 217–18; Mgt 202, 218; and one 211, BAd 203 or 204, as appropriate, or equivalents .....

2. *Required Courses in Administration*
Mgt 201, 204, and 207 .....
One policy course, as appropriate, selected from Acct 276; 297; HCA 206; or Mgt 263 .....

3. *Field of Concentration* (see pages 152–56)
Twelve semester hours of course work, planned and schedu the student's academic advisor .....

4. *Research Requirement*
Students electing to write a thesis will complete the appropria course (299-300); those not electing to write a thesis will comp of the appropriate courses selected from BAd 295, Mgt 295, or HCA 207, plus one three-semester-hour elective .....

5. *Electives* .....

Fields of Concentration

Students select a minimum of 12 semester hours from one ing fields of concentration.

ACCOUNTING

This field provides a contemporary, broadly based acade which will apply equally to the fields of accounting in g dustry, and public practice, as well as to the field of general in which the manager employs accounting as an effective m standing the organization. (See pages 198–99 for program of s

ADMINISTRATION OF SCIENCE AND TECHNOLOGY

This field explores the many aspects of technology relating ing research and development management, business, an The employment of "state-of-the-art" technology and the technology through research and development are impe in the achievement of the objectives of both private firms a

The research and development environment has many un characteristics. The concentration has been designed to id the problems associated with managing creative professio

c technology. As a contextual area, the program stresses the need for
s to undertake original and meaningful research involving political,
ic, sociological, and operational problems encountered by manage-
industrial, governmental, and military research and development
ations.

ECONOMICS

ld covers economic institutions and analytical methods from the
nt of business or governmental management. Its purpose is to
(1) a broad understanding of the tools of economics; (2) an analy-
wer with respect to various facets of an organization's activity or
ganizational areas of special interest; (3) a skill in problem-
applications of economic tools; (4) an ability to interpret historical
ment and predict future trends in firms, industries, and economies;
miliarity with the institutional setting of economic activity; and
ppreciation of the economic reasoning behind public policies.
a strong orientation to the economic problems of organizations, this
concentration is based on the methodology of general economics,
supplements with the methods of management science.
ed economics presumes skills in quantitative methods, statistics,
rmediate-level general economics. It is offered in a sequence that
ces with courses based on microeconomic and macroeconomic
pectively.

RAL SCIENCES IN ORGANIZATION DEVELOPMENT

ld of study reflects the assumption that the effective utilization of
vioral sciences is concerned with both means and ends; that the
t in behavioral science not only is skilled in theory and research
applies technical and specialized knowledge as a conscious force
ive organizational growth and improvement. Thus, courses are de-
o equip the student with organizational concepts and behavioral
propriate to optimizing the utilization of a system's total resources.
rogram helps to meet the need for professionals capable of design-
ating, and developing the necessary behavioral and organizational
appropriate to rapidly changing societies. Emphasis is on the
tionships of such dimensions as motivation, leadership, problem-
organizational growth, and increased complexity of modern organi-
nd their effect upon the functions of organizational development.

S-GOVERNMENT RELATIONS

ld provides a knowledge and understanding of the total business
ment essential to business policy formulation and execution; gives
appreciation of the role and function of business in a free enter-
iety, its environmental needs for optimum effectiveness, and what
ent can and should contribute to that environment; familiarizes
with successful techniques by which the content and direction

of public policy toward business can legally be influenced; a
students with a thorough knowledge of current government po
business, contemporary issues affecting government-business r
possible solutions to problems in this area.

This field is based on the premise that the enormous influenc
ment on business and vice-versa—exercised in the roles of re
tomer, supplier, protector, and competitor—will become
pervasive and that business policy formulation and execution
decision-making will become increasingly dependent upon thor
edge and understanding of the total environment of busines
importantly, of government policies, programs, and laws affect

FINANCE AND INVESTMENTS

This field prepares students for careers in finance and investm
ing a background in business budgeting, controllership, treasur
planning, reporting and financial management processes.
designed to emphasize the planning, analysis, implementatio
trols necessary for making effective financial decisions. Instruc
applies to manufacturing and trading enterprise but, in addi
railroad and public utility financing. Each, however, has distin
ing features. Most financial dogmas have a universality tha
business lines, and variations are more a matter of degree th
substantive difference.

GENERAL MANAGEMENT SYSTEMS AND ORGANIZATIONAL CYBER

This field addresses the critical need for management to de
with the fact that human institutions of all kinds tend to b
and more complex as changes accelerate both socially and te
In many traditional academic fields general systems and cy
cepts have evolved as the interdisciplinary mode for u
increasingly complex systems. This has profound relevance
temporary operating manager and policy-maker.

Because this program is essentially interdisciplinary and tr
in nature, the student is afforded an unusually broad range of
to apply educational experience to managerial, organizationa
problems. Professional and academic career potentials are a
following fields: (1) research and teaching in the growin
systems and cybernetics oriented programs now emergin
and universities in the United States and elsewhere in th
institutional/environmental interface management or consulti
focused organization development consulting or staff work
and government agency long-range (strategic) planning a
tivities; and (5) advisory and staff positions and program
global agencies such as operating components of the U
multinational corporations and foundations, and multi-gover
cies such as OECD, as well as in the agencies and departmen
governments.

CARE ADMINISTRATION

ld of study consists of both on-campus academic studies and pus field practice assignments. For further information see the tion for the degree of Master of Arts in Health Care Administration s 158–60.

ATION SYSTEMS TECHNOLOGY

ld is designed to provide a managerial understanding of the prin- of manual, mechanical, and electronic information processing, in- computer programming concepts, methods, and languages; an ation of the capabilities, limitations, and selection procedure of tion processing equipment; a knowledge of all phases of manage- formation systems development, implementation, and evaluation; understanding of the roles of both management and systems per- in information technology. It also provides an appreciation of the information systems technology as a tool of management.
nts participate in the development of management information ; in the selection of computer equipment; and in the installation, ment, and evaluation of management information systems—during ssions.

ATIONAL BUSINESS

ld is designed to prepare students for careers in firms operating ultinational basis or about to enter the international field; for in the federal government and in international agencies concerned siness, industry and finance abroad; and for the commerce option Foreign Service Officer Examination.
program is also designed to provide foreign students with the back- and skills necessary to promote international business, and to pre- em for careers in foreign and domestic firms within their own es and for commercial officer positions within their governments. student's program is individually developed by the student's advisor ng to the student's background and interests.

TING

ld is devoted to the development of professional marketing man- hose responsibilities may include planning and developing new s, services, and ideas; advertising, selling, and merchandising; and ng distribution channel systems. Courses cover all aspects of the ng management function. Foundation courses are *Marketing Man-* *t, Buyer Behavior,* and *Marketing Research.* Functional courses are *on Management, Marketing Channels,* and *Marketing Strategy.* zed elective courses, *International Marketing, Marketing to the* nent, and *Marketing and Public Policy,* utilize the resources of the gton metropolitan area.

PERSONNEL MANAGEMENT

This field is concerned with all aspects of the employment of sources in business organizations. Career opportunities domestic and international business organizations, hospitals sociations, research and educational institutions and local federal government agencies. Courses encompass all phases cruitment, selection, employment, and development of people relations, unionism, collective bargaining, labor relations and utilization.

PROCUREMENT AND CONTRACTING

This field responds to the recognized need for greater profe and sophistication among those engaged in procurement activ federal government and in contracting activities of vendors to government.

The sustained increase in federal purchasing—in volume, complexity—places ever greater demands upon the skill and ness of procurement and contracting personnel. The field ha been designed with the following objectives: (1) to provide a fessional education in the knowledge and skills necessary in this field; (2) to develop in the student increased ability decision-making, and communications; (3) to increase the s preciation of the economic, social, legal and technological co present in procurement and contracting activity.

QUANTITATIVE ANALYSIS FOR DECISION-MAKING

This field develops a thorough understanding of quantitative or cal approaches to problems of managerial control and decis While the program will develop a competent backgrou mathematical theory associated with the various techniques, toward applications of the techniques rather than their theore matical content.

MASTER OF PUBLIC ADMINISTRATION

The Master of Public Administration (MPA) degree program student for a professional career in public service. The 36-h outlined below, is intended to provide both a generic core for and specialized areas of concentration tailored to the interest objectives of each individual student. The curriculum provid instruction in all areas recommended by the Guidelines an for Professional Master's Degree Programs issued by the Natio tion of Schools of Public Affairs and Administration.

All students are required to complete a seven-course (21-se core, which includes courses in public administration and public expenditure analysis, public policy, organization the behavior in organizations, and research methods.

student selects, in addition, an area of concentration designed to him or her with deeper and broader knowledge in a field of par- nterest. The areas of concentration generally require a three-course ter-hour) sequence. The program is sufficiently flexible that, with roval of a faculty advisor, the student may design a special field one of the fields offered matches individual learning and career es.

nts who lack substantial knowledge of the structure and func- of government are strongly encouraged to take one of two courses rican administrative institutions: PAd 213 *Administration in the Government* or PAd 250 *Administration of State and Local Gov- s*. The remainder of the program consists of one to three elective chosen by the student with the advisor's approval. The electives taken in any related program or discipline.

se the public service requires a wide variety of expertise, students undergraduate degree backgrounds are considered for admission. e no prerequisites.

d Courses

ADMINISTRATION CORE (21 hours)

05 Introduction to Public Administration and Management
52 Public Expenditure Analysis and Planning
14 Policy Analysis in Public Administration *or*
60 Policy Formulation and Administration
21 Organization Theory and the Public Sector *or*
23 Behavioral Factors in Large and Complex Organizations
07 Human Behavior in Organizations
94 Statistical Applications in Public Administration
95 Research Methods

F CONCENTRATION (9 hours for most fields)

al Science
-Government Relations
nental Administration
ental Administration
ion Technology and Systems Management
onal Trade
er Management
tion and Management
nalysis and Evaluation
udgeting and Finance
ersonnel Administration
tive Analysis for Decision-Making
and Development Administration
dministration
nd Regional Planning
ield (approved by advisor)

ES

vo courses (three to six hours)

MASTER OF URBAN AND REGIONAL PLANNING

The program of graduate study in Urban and Regional Planni
the professional planning degree of Master of Urban and Regiona
It is designed as preparation for careers on the municipal, co
and national levels, and for private practice. The course
designed to provide a broad education, to develop competen
ning theory and methodology, and to emphasize the analytical
creativity necessary for solving urban and regional problems
dent's program is designed in consultation with an assigned
visor in accordance with individual career plans.

The degree is awarded by vote of the Faculty after satisfa
pletion of (1) from 45 to 50 semester hours of course work,
upon the background and experience of each individual stude
ing a thesis equivalent to six semester hours (most students will
be required to take 50 semester hours); (2) a minimum of thre
full-time professional training in a planning agency under quali
vision, with an acceptable written report to be submitted after
of the training period; (3) a written Master's Comprehensive Ex
and (4) a thesis based on the candidate's research in the field
and regional planning.

MASTER OF ARTS IN HEALTH CARE ADMINISTRATION

The program of study leading to the degree of Master of Arts
Care Administration consists of a basic minimum two-year
graduate study, normally including both on-campus academ
and off-campus field practice assignments. The length of each
dependent upon the study-in-depth concentration which the stu
The majority of students begin their studies in the fall semest
year. However, a limited number of qualified students may be
to begin their course work in the spring semester and summe
The basic curriculum is developed in keeping with the backg
professional goals of each student and ordinarily consists of a
of 48 semester hours. Undergraduate courses in accounting, econ
statistics (three semester hours each) are required as a prerequi
of the concentrations in this program.

Ordinarily full-time students can expect to complete the
phase of the degree program in two to three semesters, and the
tive residency or field practice in one to two calendar years
time depends on past academic course work and experience in
care field.

Fields of Concentration

Students will select one of the following concentrations: admi
of long-term care facilities, health planning, health information
hospital administration.

ISTRATION OF LONG-TERM CARE FACILITIES

oncentration is designed to prepare students for administration in reas as nursing homes, facilities for the aged, mental hospitals and unity health clinics.

ng the first phase the student must complete a satisfactory academic m of course work, selected in accordance with the student's back- l and needs. These courses cover the general technical background lth care administration, general administrative theory and practice, oblem-solving in the management of extended care and long-term atients.

second phase is a period of field experience as an administrative nt under a qualified preceptor. A written major report or selected roject reports are required.

H PLANNING

oncentration is designed to prepare students to plan for and coordi- l aspects of private and public health care systems in accordance ound management principles. It is an interdisciplinary program which es courses from (1) health care administration; (2) health care plan- 3) supporting disciplines such as sociology, urban and regional ng, quantitative methods, and public administration; and (4) a par- area of concentration selected by the student to gain a specific

ddition to the course work there are periods of supervised field ence. Written reports are required.

H INFORMATION SYSTEMS

ncentration recognizes the rapidly growing demand for individuals n develop and implement the use of computer-based information s in decision-making approaches. It is designed to prepare those who supervise and coordinate data collection, processing and retrieval es for health care complexes.

ng the first phase the student must complete a satisfactory academic n of course work, selected in accordance with the student's back- and needs. These courses cover the general and technical back- of health care administration and general administrative theory and e. In addition, students must complete required courses in com- ervices and information handling.

econd phase consists of supervised field experience, which includes reports.

AL ADMINISTRATION

ncentration is divided into two phases. During the first phase the must complete a satisfactory academic program of course work, in accordance with the student's background and needs. These

courses cover the general and technical background of he
administration, general administrative theory and practice, and g
solving in management as it relates to short-term care hospitals.

The second phase is a period of field experience as an admi
resident under a qualified preceptor. A written major report or
field project reports are required.

POST-MASTER'S GRADUATE CERTIFICATE IN HEALTH CARE ADMINISTRATION

Students with approved master's degrees from accredited institu
take a special post-master's program leading to a Post-master's
Certificate in Health Care Administration. Each program will be
to meet the professional needs of the individual student, whether
dent wishes to undertake a new field of study or to amplify k
of work done at the master's level.

DOCTORAL PROGRAMS

Study for the degree of Doctor of Business Administration an
of Public Administration is supervised by the Committee on
Studies.

Admission

The minimum admission requirement is a bachelor's degree, prefe
a major appropriate to the proposed field of study. Applica
degree are in fields other than business or public administrati
pected to obtain the necessary background either before or
admission to the program. Scores on the Graduate Record Exam
the Graduate Management Admission Test are required. How
cants who have taken the Law School Admission Test or the M
lege Admission Test may submit these test scores for considerat
special circumstances, scores on the Miller Analogies Test may a
mitted. Applicants whose test scores are more than 10 year
encouraged, but not required, to take or retake the Graduate Rec
nation or the Graduate Management Admission Test. Arrangeme
these tests must be made with the Educational Testing Service.
whose native tongue is not English must also submit the Test of E
a Foreign Language (TOEFL) scores (see pages 25–27).

The Doctoral Committee does not use specific cutoff points
averages and test scores. It carefully reviews each applicant's en
and makes its selection on a competitive basis in keeping with
limitations.

This evaluation takes three to four weeks, after which the A
Office notifies each applicant, through the mail, of the
decision. Completed applications must be sent to the Office
missions Officer, School of Government and Business Adm
George Washington University, Washington, D.C. 20052, by M
the fall semester and summer sessions, and by October 1 for

er. Graduates of non-U.S. universities must apply by February 1 for ll semester and summer sessions, and by September 1 for the semester.

f Study

octoral programs in both Business Administration and Public Adration consist of six sequential components: basic preparation, anamethods, the doctoral seminar, major and supporting fields, dissertaroposal defense, and dissertation approval. Each of these elements is led to contribute to an accumulative foundation for subsequent aca- activities. While some deviation from this program pattern may be ved, doctoral students normally will be expected to complete their preparation and analytical methods, as specified by their major upporting field advisors, prior to undertaking course work or other mic endeavors in the major and supporting fields. It is also expected he doctoral seminar would be completed early in this program nce, preferably before the student embarks on the chosen doctoral . All doctoral courses and other academic activities preparatory to tation research will be completed prior to the formal defense of the nt's dissertation proposal.

asic Preparation:

al courses and/or readings which provide the student with the sary background on the functional aspects of public and private izations, as well as on the political, economic, social, and legal enments in which these organizations exist.

nalytical Methods:

390 (*The Philosophical Foundations of Administrative Research*) is red. In addition, formal courses and/or readings dealing with the tical methods appropriate to the student's proposed major and supng fields of study may be required.

octoral Seminar:

e-year (3-3 credit hour) seminar entitled: *Public-Private Sector Insti*ns and Relationships will be required of all candidates. This seminar ld be completed during the first two or three semesters of program lment.

lajor and Supporting Fields:

al course work, readings, and/or other activities approved by the acc advisors and the Committee on Doctoral Studies are required as ppriate to the student's long-range goals. The major field of study is ded to enable the student to obtain in-depth knowledge in the chosen pline. The supporting field is expected to relate to the major field o round out the student's academic background. Both fields may be ted from the fields of study offered by the faculty or may be defined ne student according to individual interests.

(5) Dissertation Proposal Defense:

Upon completion of all academic activities stated in the st
student is expected to form a three-member dissertation
visory committee, which may include both the major and sup
advisors. Under the guidance of the advisory committee, the
develop a comprehensive dissertation proposal and schedule
through the office of the Committee on Doctoral Studies.

The oral defense of the dissertation proposal will be condu
dissertation research advisory committee, together with two
examiners appointed by the chairperson of the Committee o
Studies. After the successful defense of the proposal, the st
embark upon the preparation of the dissertation.

(6) Dissertation Approval:

After the completion of the dissertation, the advisory committe
with two additional readers appointed by the chairperson of the
on Doctoral Studies, will evaluate the dissertation.

If so desired, the student may hold an informal seminar in w
she reports the results of the research to the faculty and inte
dents subsequent to dissertation approval.

Printed copies of detailed regulations regarding the form
duction of the dissertation, preparation of the abstract, and servic
by University Microfilms, Inc., are available in the Office of
mittee on Doctoral Studies.

Residence

Full-time students are expected to register for nine to 12
hours, part-time students for six semester hours. All work for th
degree must be completed in seven years unless an extension
granted by the Committee on Doctoral Studies. All courses mus
on campus. The required minimum grade point average is 3.25.

While writing the dissertation the candidate must register
of 24 hours of *Dissertation Research* in the department staff
search advisory committee. Full-time students must register fo
12 hours a semester for two semesters, and for sufficient hours
semester to complete the 24-hour requirement. Part-time stu
register for six semester hours per semester for four semesters
sertation has not been completed during the time the student has
for the required 24 hours, the student must register for three
hours of *Dissertation Research* each succeeding semester until th
tion and final dissertation approval are satisfactorily completed

The Committee on Doctoral Studies expects all students
registered until all degree requirements are satisfied. By failing
for one semester or more, the student breaks registration and
for readmission to the School under whatever new conditions a
tions are set up by the Committee. The student who has
requirements, but whose graduation is deferred for any rea
maintain continuous registration by paying the continuous re
fee each semester until graduated.

more detailed information on both the regular and the experi-
doctoral program, see the *Handbook of the Doctoral Programs in*
ss and Public Administration, available in the Doctoral Programs

AL PROGRAMS

rnment Intern Scholarship Program

Government Intern Scholarship Program offers annually 50 scholar-
to assist government agencies in training carefully selected young
and women for administrative leadership in government career
e. Each scholarship provides a tuition-free course of three semester
per semester, and interns who maintain satisfactory standing in both
academic program and their government training program may
y for a second scholarship for one additional semester.

nuing Education in Health Care Administration

degree program is conducted, both on campus and off campus, in the
s areas of health care administration whenever a sufficiently large
s organized. Institutes, workshops and lecture series are conducted
the auspices of program faculty and selected leaders from local,
and regional areas on topics of current interest to the requesting
zation. There is no specific prerequisite. Fees are to be announced.

tional Institute for Health Care Administration

gnition of special educational needs of students from other coun-
he International Institute for Health Care Administration offers
ms of instruction designed to meet these needs at either the degree
ificate level.

also equipped to enter into arrangements with principals of hospital
s in world-wide areas to assist in the preparation of teaching pro-
or the actual instruction of administrative personnel either abroad or
University.

ed Master's and Juris Doctor Degree Program

in instances arrangements may be made for students to work
ently toward both the Juris Doctor degree in the National Law
and a master's degree in some fields in the School of Government
siness Administration. Students must be admitted both to the
Law Center and, separately, to the School of Government and
Administration and must meet all requirements in each degree
. It is possible for a student to complete work for both degree
s within four years.

Certification of Purchasing Managers

The School of Government and Business Administration partici
the three nationally recognized certification programs.

Certified Public Purchasing Officer (CPPO)
Administered by:
National Institute of Governmental Purchasing
1001 Connecticut Avenue, N.W.
Washington, D.C. 20036

Certified Professional Contracts Manager (CPCM)
Administered by:
National Contract Management Association
Crystal Plaza #1, Suite 808
2001 Jefferson Davis Highway
Arlington, Virginia 22202

Certified Purchasing Manager (CPM)
Administered by:
National Association of Purchasing Management
11 Park Place
New York, New York 10007

Bachelor of Science in Health Care Administration

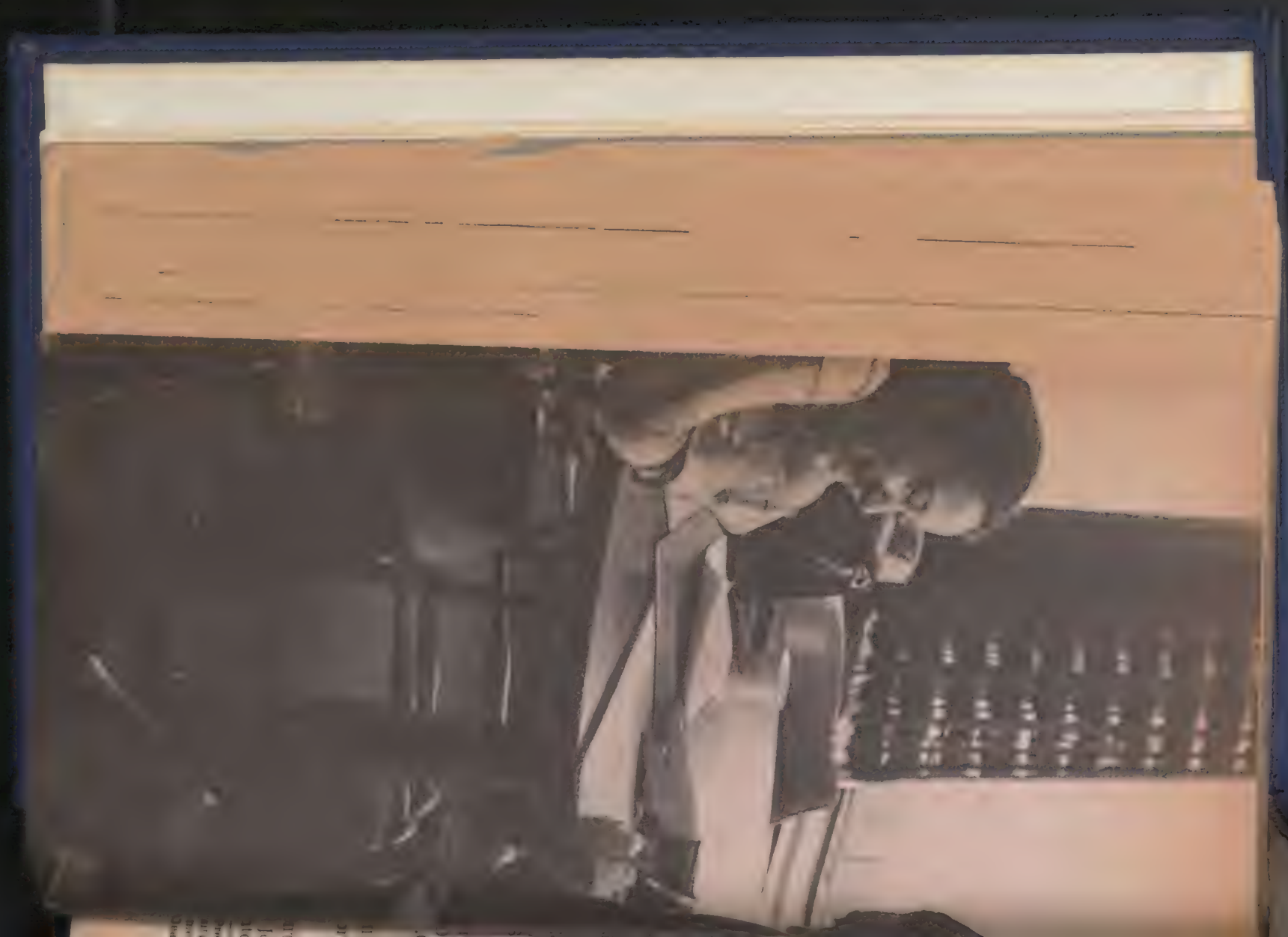
A program of study leading to the degree of Bachelor of Science i
Care Administration develops persons for beginning administra
planning level positions in hospitals and related health organiza
this time the degree program is limited to students in the Nava
of Hospital Administration in Bethesda, Md.

Off-Campus Degree Programs

The School of Government and Business Administration has
jurisdiction over off-campus programs leading to the degree of
Science in Administration.

The degree program is administered by the College of General
For details concerning the off-campus programs see the *College of
Studies Bulletin.*





OOL OF PUBLIC AND INTERNATIONAL AIRS

M. Sapin

TY*

ors J. Aschheim, R.H. Davison, R.M. Dunn, Jr., M. Gordon, A. gy, P.P. Hill, H.C. Hinton, M.A. Holman, C. Hsieh, J.W. Kendrick, im, H.L. LeBlanc, R.K. Lewis, J.A. Morgan, Jr., J.N. Mosél, C.A. r, B. Nimer, V. Petrov, H. Pollack *(Research)*, B. Reich, J.W. Robb, Sachar, B.M. Sapin, R.P. Sharkey, C.W. Shih, G. Sigur, H. Solomon, tambuk, C.T. Stewart, Jr., R.B. Thompson, R. Thornton, H.B. bson

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te Professors R.L. Cole, C.F. Elliott, R.S. Goldfarb, W.R. Johnson, Klarén, C.A. Linden, J.M. Logsdon, J.C. Lowe, J.K. McDonald, H.R. G.A. Olkhovsky, E.O. Pederson, A.H. Teich, S.J. Wayne, A.M. r, R.Y. Yin

t Associate Professor V.T. Coates

nt Professors C.M. Aho, J.J. Cordes, D. Fischer, A.K. Fitzsimmons, Lee, G.C. Mackenzie, C. McClintock, L.P. Ribuffo, S. Shaffer, R. s, M. Sodaro *(Visiting)*, G.C.Y. Wang, S. Wolchik *(Visiting)*

ttees†

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ble, C.F. Elliott, M. Gordon, P.P. Hill, H.C. Hinton, W.R. Johnson, nden, J.M. Logsdon, J.K. McDonald, H.R. Nau, V. Petrov, S. Shaffer, hih, G. Stambuk, A.H. Teich, R. Thornton

TTEE ON PROGRAMS AND CURRICULUM

avison, R.M. Dunn, Jr., A. Gyorgy, H.C. Hinton, Y. Kim, J.M. Logs- C. Lowe, B. Nimer, C.W. Shih

TTEE ON ADMISSION AND ADVANCED STANDING

don, W.R. Johnson, C.A. Linden, A.H. Teich, A.M. Yezer

TTEE ON EAST ASIAN STUDIES

ohnson *(Chairman)*, H.C. Hinton, Y.C. Kim, C. Shih, G. Sigur, R. on, R.Y. Yin

sident of the University, the Vice President for Academic Affairs, the Registrar of the . the Director of Admissions of the University, and the University Librarian are ex mbers of the Faculty of the School of Public and International Affairs.
n of the School is an ex *officio* member of all committees.

COMMITTEE ON RUSSIAN STUDIES
C.A. Linden, C.F. Elliott *(Chairman)*, A. Gyorgy, G.A. Olkhovsky
R.B. Thompson, R. Thornton, H.B. Yakobson

COMMITEE ON WORK-STUDY AND INTERNSHIP PROGRAMS
R.L. Cole, D. Fischer, G.C. Mackenzie

INTRODUCTION

With the establishment in 1898 of the School of Comparative Jur and Diplomacy, the study of government was first organized as entity in the University. In 1928, this School was reorga broadened as the School of Government. During the next tw programs in business administration and public administra added, and the emphasis gradually shifted from undergraduate study. The name was changed in 1960 to the School of G Business, and International Affairs to reflect more accurately the of the School. A division of the School was effected in 1966 schools were established—the School of Government and Busine istration, a primarily professionally oriented school, and the Public and International Affairs, a primarily policy-oriented sc

Programs of the School of Public and International Affairs disciplinary, and emphasize both domestic and foreign gov policy.

Students in the freshman and sophomore years are registered bian College of Arts and Sciences, the liberal arts college o versity, and are assigned special advisors from the School of P International Affairs to assist them in planning their programs.

Academic Programs

Programs available within the School of Public and Internatio are undergraduate fields in Chinese Language and Literature, Studies (China and Japan), and Urban Affairs; undergraduate an fields in International Affairs and Public Affairs; and graduate East Asian Studies, Latin American Studies, Russian Studies, an Technology, and Public Policy. Special programs in Soviet, Fa and East European studies are offered by the School's Institute Soviet Studies.

Objectives

Four undergraduate programs of study—East Asian Studies, Int Affairs, Public Affairs and Urban Affairs—are aimed at prep student to understand major contemporary issues in internatio or in domestic public affairs. The programs are designed not t narrow professional specialists, but to foster a liberal educatio ciplinary in nature and broader than a concentration in one o ventional disciplines. In each program there is double effort: t a background as broad and as deep as possible in order to ass

standing and analysis of modern problems and to give instruction
me useful tools of analysis. The program in Chinese language and
ure is closer to the traditional liberal arts pattern, emphasizing
age and culture.
graduate programs leading to the degree of Master of Arts are more
ntrated. The student is expected to develop a greater competence
area or a discipline, building on the student's undergraduate program
paration for professional employment in government, in international
izations, in business, or in private agencies concerned with public
ernational affairs.

ULATIONS

ations concerning admission, registration, fees, and finances are
on pages 20–34; other University regulations, on pages 45–53.

dance

nts may not attend classes until registration is completed and fees
re paid.
dents are held responsible for all the work of the courses in which
ered, and all absences must be excused by the instructor before
ion is made to make up the work missed.
tudent suspended for any cause may not attend classes during the
of suspension.

drawal

drawal after the end of the fifth week of classes (fall or spring
ter) without academic penalty is permitted only in exceptional cases
Withdrawal," page 47).

DEGREE OF BACHELOR OF ARTS

School offers programs leading to the degree of Bachelor of Arts in
elds of Chinese Language and Literature, East Asian Studies (China
apan), International Affairs, Public Affairs and Urban Affairs.

ANCE REQUIREMENTS

tisfactory completion of the Chinese Language and Literature, East
Studies, International Affairs, Public Affairs or Urban Affairs cur-
m in Columbian College of Arts and Sciences (see pages 78–80), or
uivalent, is required.

RAL REQUIREMENTS FOR THE DEGREE

llowing requirements apply to both the standard 120-semester-hour

and the special 90-semester-hour programs. See pages 170–7 requirements for the 90-semester-hour program.

Academic Work Load

Normal academic work load for the full-time student is 15 se A student with a strong academic record may take up to hours with the approval of the dean.

Scholarship Requirements

In order to graduate, a student must have the following: (1) hours (or 90 semester hours if the student qualifies for the semester-hour program) of passing grades (courses in human leisure studies cannot be included in the required hours); an of *A* or *B* in four three-semester-hour courses in the major, to residence at George Washington University. The major inclu quired second-group courses (101-200) and courses taken in options.

DEAN'S HONOR LIST

The name of every student who attains a 3.50 quality-point course work is placed on the Dean's Honor List for that semest ance on the list will be limited to (1) full-time students regis minimum of 12 semester hours and (2) part-time students regis minimum of 12 semester hours over a period of two consecutive which may include a summer term.

ACADEMIC STANDING

A student who is not suspended or on probation is considere good standing.

The rules below govern probation and suspension and are as stated to students enrolled for a full-time program (12 seme or more) during the fall or spring semester or the three summe For students taking less than 12 semester hours in any one s summer session, these rules are applied on the basis of 12 or m taken during two or more semesters or summer sessions.

PROBATION

Students who in one semester receive two grades of *F*† in course three or more semester hours of credit each, or the equivalent, on probation. Those on probation who receive one grade of *F*

* See page 46 for explanation of the quality-point index.
† In determining whether a student is placed on probation or suspension, two gra equated with one grade of *F*. Thus, for example, a student who receives one gra two grades of *D* is placed on probation, and a student who receives two grades o grades of *D* is suspended.

will be continued on probation for a second semester. Those on pro-
taking 12 or more semester hours whose grades are all *C* or better
oved from probation.

SION

llowing three cases constitute ground for suspension: (1) three
of *F** in courses carrying three or more semester hours of credit
equivalent; (2) two grades of *F* when on probation; (3) one grade of
in a second semester of probation.
nts who are suspended for poor scholarship may apply for re-
on after the lapse of one fall or spring semester. To be considered
dmission, the student must pass prescribed tests and submit evi-
o the Dean's Council of conduct during absence from the University
indicates that the student will profit from readmission. Students
ted after suspension are on probation. Those who are still on pro-
after completing 24 credit hours, will be suspended. A student
ded twice for poor scholarship will not be readmitted.

PLETE/AUTHORIZED WITHDRAWAL

ions under which the grades of *I* (Incomplete) or *W* (Authorized
awal) may be assigned are described on page 46.
oving an Incomplete—The grade of *I* must be removed no later than
t day of the examination period for the fall or spring semester im-
ely following the semester or summer session in which the grade
assigned. An "Incomplete" that is not removed within this period
matically changed to an *F*. In cases of well-documented extenuating
stances, an instructor and a student may jointly petition the dean,
appropriate committee, for additional time in which to complete
ork of the course. Such petitions should be submitted within the
period. The grade of *I* cannot be removed by reregistering for the
here or by taking its equivalent elsewhere.

ence

imum of 30 semester hours, including at least 12 hours in the major
must be completed while registered in the School of Public and In-
ional Affairs. This requirement applies to students transferring
the University as well as to students transferring from other insti-
. Unless special permission is granted by the dean to pursue work
ere, the work of the senior or final year must be completed in the
of Public and International Affairs.

Correct English

udent whose written or spoken English in any course is unsatisfac-

rmining whether a student is placed on probation or suspension, two grades of *D* are
with one grade of *F*. Thus, for example, a student who receives one grade of *F* and
es of *D* is placed on probation, and a student who receives two grades of *F* and two
f *D* is suspended.

tory may be reported by the instructor to the dean. The dea
supplementary work, without academic credit, varying in am
needs of the student. If the work prescribed is equivalent to
regular tuition fee is charged. The granting of a degree ma
for failure to make up any such deficiency in English to the
of the dean.

Study Abroad

Students wishing to study abroad must consult with their advi
dean, because arrangements must be made on an individual ba
should receive the dean's approval, in advance, for their pl
abroad if they plan to have the credits earned abroad apply to
program in which they are registered. A catalogue or other de
the foreign institution or study program should be presented fo
tion together with detailed descriptions of the courses to be take
of international affairs are encouraged to travel and study abro

Credit/No Credit Option

A student in the School of Public and International Affairs
cumulative quality-point index* of 2.5 or better may, with the
the advisor and the dean, take one course each semester an
grade of *CR*, Credit, or *NC*, No Credit, which will be recor
student's transcript but will not be reflected in the cumula
average. A student must sign up for such an option at registra
no circumstances may a student change from credit/no cred
graded status, or vice versa, after the end of registration. Cou
student's major (except those in which the grade of *CR* or *NC*
assigned) may not be taken on a credit/no credit basis. A trans
may not elect to take a course on a credit/no credit basis until
semester of enrollment in the University. Students in the
Public and International Affairs may take no more than six
which the grade of *CR* or *NC* is assigned, including those in
grade of *CR* or *NC* is normally given and those taken in any ot
school, or division of the University prior to transferring to
of Public and International Affairs.

Correspondence and Home-Study Courses

Credit for correspondence or home-study courses is not accep
cannot be applied toward a degree.

Additional Requirements for the 90-Semester-Hour Program

Exceptional students may, when registered as freshmen or so
in Columbian College of Arts and Sciences, petition the dean of
of Public and International Affairs for admission to a special 90-
hour degree program in the School of Public and International
Supporting evidence in the form of achievement test scores,
Level Examination Placement (CLEP) scores, and grades earned

* See page 46 for explanation of the quality-point index.

gton University or any other institution must be supplied. The dean, ultation with the Dean's Council, will determine eligibility for ad- to the program, which takes place when the student enters the of Public and International Affairs at the beginning of the junior

ddition to the general requirements (see pages 167–71) and the lum requirements (see pages 171–74), students in the 90-semester- rogram must fulfill the following requirements.

he student must receive grades of *A* in 50 percent of the total course- and also in 50 percent of the courses required in the major.

he student must take at least 60 semester hours in courses beyond t-group level (numbered above 100).

he 90 semester hours of credit must be earned in actual course- i.e., credit through advanced placement, special examinations, etc., ot be counted in the 90 semester hours required for graduation.

dents who qualify for admission to the 90-semester-hour program couraged to begin taking second-group courses (numbered 101-200) n as they are qualified to do so, and should seek to obtain a waiver rse prerequisites in those disciplines in which they have a strong ound.

ICULUM REQUIREMENTS

recommended by the faculty for graduation, candidates are required plete, in addition to the appropriate freshman and sophomore work ages 78–80), a minimum of 60 semester hours during the junior and years, as set forth in one of the following curricula.

g Credit or Waiving Requirements by Examination

formation on earning credit or waiving curriculum requirements, see bian College of Arts and Sciences, pages 76–77.

Fields of Study

rements for the five major fields of study leading to the degree of lor of Arts are listed below. Students should consult the appropriate ment in the "Courses of Instruction" section of this catalogue for ete course descriptions.

SE LANGUAGE AND LITERATURE

equisite—A minimum of 60 semester hours in Columbian College (see), or the equivalent from another accredited institution.

irements for the *Major*—Chin 11–12, 109–10, and 163–64; plus 12 addi- semester hours of second-group Chinese literature courses. The student ired to pass a major examination at the end of the senior year. The co- ed field of knowledge upon which the student will be examined includes ve command of modern Chinese language and a general knowledge of e literature and culture. A proseminar (Chin 199–200) assists the student aration for the major examination.

Students in the Chinese language and literature program m
in the junior year.

EAST ASIAN STUDIES (China and Japan)

The major in East Asian Studies is designed to introduce th
non-Western culture and to provide an understanding of the
tics, and economy of modern China or Japan. The major i
mental and is recommended for students who wish a compre
of one of the world's major civilizations and for those who
graduate study in Chinese, Japanese, or Far Eastern affairs.

A junior year abroad is available in this program of stu
interested in China. Students should contact the chairman o
ment of East Asian Languages and Literatures.

Prerequisite—The East Asian Studies curriculum, pages 78–79, in
5–6 or Japn 3–4.

Requirements for the Major—(1) Chin 11 (China focus) or mini
additional hours of Japanese (Japan focus), and Chin 163 or 164
(China focus) or 170 (Japan focus); (3) three semester hours selecte
125, 126, 127, 132, 146, or 164; (4) nine hours selected from Hist
189, 195, 196 (either Hist 187 or 196, but not both, may be selecte
covering both pre-modern and modern periods encouraged; (5)
selected from PSc 173, 197, 198, or 199; (6) nine semester hours of
in economics, history, or political science *not related* to China or
selected in consultation with and approved by the advisor; six se
in research and writing seminar related to China or Japan and ta
pline of concentration.

INTERNATIONAL AFFAIRS

The major in International Affairs enables the student to spec
ternational political relations, international economics, interna
munications, or regional studies.

Prerequisite—The international affairs curriculum, pages 78-79.

Requirements for the Major—(1) Econ 181–82; (2) six semester
third year of foreign language (may be a literature course taugh
guage); (3) three semester hours selected from Geog 125, 126, 127
or 161; (4) Hist 136, 150, or 157, and 182; (5) PSc 140 and 142 or 144
ter hours from one of the group options listed below:

Group I. International politics—courses concerned with theory
tice in international affairs, forces shaping the world scene, and
foreign policy, selected from Geog 125, 126, 127, 139, 146 (if not
to satisfy the major requirement); Hist 138, 139–40, 149; PSc 1
108, 121, 130, 131, 146, 178, 182, 198 (PSc 142 or 144 may be elec
taken to satisfy the major requirement).

Group II. International economics—courses concerned with th
economy and American policy and practice in international trade
mance, selected from BAd 176, 178; Econ 101, 102, 104, 121, 122,
Geog 125, 126, 127, 135; Stat 111, 112.

Group III. International communications—courses concerned w

of international information programs, public opinion, psychological warfare, cultural relations and public relations, selected from 150, 153, 157, 161, 162; Geog 106, 125; Jour 145, 146; PSc 120, 146; 115, 151, 156; Soc 144.

IV. Regional study—a concentration in one of the following areas: frica—courses selected from Anth 178, 179; Hist 116; PSc 180, 181, 2) Europe—courses selected from Econ 147; Hist 128–29, 131–32, 141-7, 149, 151–52, 158; PSc 105–6, 130, 131; (3) Far East—courses selected Anth 173, 174, 175; Chin 163–64; Econ 169; Geog 164; Hist 138, 187, 188, 6; PSc 105, 173; (4) Latin America—courses selected from Anth 170, 85; Econ 185; Geog 161; Hist 163–64, 166; PSc 183, 184; interdisci-y seminar 287 (PSc 285) offered by six departments participating in atin American Studies program; (5) Middle East—courses selected Anth 177; Hist 158, 193, 194; PSc 177, 178, 179, 180; Rel 161; or (6) t Union and Eastern Europe—courses selected from Econ 133, 134; 138, 143, 145, 146, 188; PSc 108, 131 or 165, 168; Slav 161–62, 165, 93–94.

AFFAIRS

jor in Public Affairs deals with domestic government and policy.

quisite—The Public Affairs curriculum, page 79.

rements for the Major—(1) Econ 101, 161, 162; (2) Hist 175–76; (3) PSc 115, 116 or 117, 119; (4) 12 semester hours from one of the group listed below:

p I. Economics—courses selected from Econ 102, 104, 121, 122, 123, 142, 165, 181–82.

p II. Politics—courses selected from PSc 106, 110, 111, 112, 116 (if aken as a major requirement), 118, 120, 121, 122, 146.

p III. Urban affairs—courses selected from BAd 174; Econ 157; 140, 141, 142; PSc 111, 112; Soc 126; U&RP 153.

AFFAIRS

jor in Urban Affairs introduces students to the problems and issues n America and develops some of the practical skills necessary for with actual decision-making situations in urban-related occupamphasis is on urban public policy—the forces and processes that and its adequacy in terms of current and anticipated needs.

udent may specialize either in the political and administrative asthe policy-making process, or in the analysis and evaluation of policy areas. An advisor works closely with each student to a program suited to personal interests and objectives. In the ear, the student serves an internship in an urban-related agency rch organization and also attends a weekly seminar in which the perience is related to a body of academic literature.

uisite—The Urban Affairs curriculum, page 80.

ements for the Major—(1) Introduction to Urban Affairs: Econ 157 and ional three-semester-hour course in economics; Geog 140; PSc 104, 111,

117; Hist 186; plus two courses selected from Hum 40, 51–52; S
of Soc 1 requires permission of the instructor); (2) Urban res
Stat 53 and PSc 101; plus one course selected from Stat 97, 10
Acct 1–2; (3) Specialized topics: three courses selected from BA
162, 165, 243; Geog 141, 142, 143; PAd 246, 249, 250; Soc 223;
(special arrangements necessary to take graduate courses in pu
tion or urban and regional planning); (4) Senior internship
PSc 188 and 193—the grade of *CR* (Credit) or *NC* (No Credit)
PSc 188. A student may elect to fulfill the internship require
position in lieu of registering for PSc 188; however, the student
six semester hours of elective course work.

Because they participate in the senior apprenticeship and sem
urban affairs may not select courses in the Service-Learning Pro

THE DEGREE OF MASTER OF ARTS

This School offers programs leading to the degree of Master
major fields of East Asian Studies, International Affairs; L
Studies; Public Affairs; Russian Studies; and Science, Tec
Public Policy.

ADMISSION REQUIREMENTS

Application forms are available from the Graduate Adm
School of Public and International Affairs, George Washingt
Washington, D.C. 20052.

A bachelor's degree from an accredited college or univers
average or better, or the equivalent, in the relevant undergra
is normally required. If there is evidence of special promise,
Graduate Record Examination scores, an applicant whose ac
falls short of *B* will be given serious consideration. Scores o
Test of the Graduate Record Examinations as well as letters
dation are required.

In East Asian Studies—An undergraduate major in a per
required. For the concentration in Chinese language and
undergraduate program should have included 24 semester ho
language study.

In International Affairs—The applicant's undergraduate p
include background courses corresponding to the interdepart
graduate major in international affairs at this University (see
or some other relevant social science program. In the case
ciencies in the social sciences or international relations, ad
work may be specified beyond the minimum requirements
degree. The student's particular responsibilities will be in
letter of admission to the program and in the course of s
sultation with an assigned faculty advisor.

In Latin American Studies—The applicant's undergrad
should include background courses corresponding to an
major in Latin American Studies at this University (see
equivalent. Majors in other fields may be considered for

r undergraduate course work includes Spanish or Portuguese
ient course work in three of the following six areas: anthro-
conomics, geography and regional science, Hispanic literature,
nd political science.

c Affairs—An undergraduate major in public affairs, economics,
political science, depending upon the field of specialization in
r's program, is required. Students entering the program are as-
have had some college-level course work in American govern-
politics, American history, and economic theory. To the extent
dent lacks such a background, the student must, in consultation
dvisor, undertake the appropriate remedial course work, including
ses which may be taken for graduate credit.

ian Studies—An undergraduate major in a pertinent field is re-
ne undergraduate program should have included the following
r equivalent: Hist 145, 146; PSc 131; Slav 1–2 and 3–4, or 5–6.

ce, Technology, and Public Policy—Undergraduate majors in a
or physical science, or in engineering are eligible for admission,
hose lacking adequate preparation in relevant social sciences,
y economics, may be required to take additional courses; such
nts will be indicated in the letter of admission to the program.

on

e student who has not maintained continuous registration and has
ered for one or more semesters must file an application for re-
the semester before planning to return to school. Applications
ssion are reviewed by the dean and the Committee on Admission.

REQUIREMENTS

two options available in all fields leading to the Master of Arts
ne requires a minimum of 24 semester hours of approved gradu-
plus the successful completion of a thesis; the student must
six semester hours of *Thesis Research* (299-300). The second
uires a minimum of 36 semester hours of graduate course work
ot include a thesis. The course work for both options is taken in
n for the Master's Comprehensive Examination.

tes for the degree of Master of Arts are required to submit an
proved "Program of Studies" (comprehensive fields, supporting
rk, tool requirement, etc.) to the office of the dean by the end
semester in residence.

degrees are awarded by vote of the Faculty after the student
eted the required course work and an acceptable thesis (if one
has satisfied the foreign language or tool requirement, and has
Master's Comprehensive Examination.

pecial circumstances second-group courses (numbered 101-200)
nted toward the master's degree when registration for graduate
been approved at the beginning of the course by the curriculum
e instructor and the dean. The student who takes an under-
ourse for graduate credit is expected, by arrangement with the
to do work at the graduate level in addition to the regular

work of the course. Normally, no more than six semester hou
group courses may be taken for graduate credit in the 30-s
program, and no more than nine semester hours may be taken
credit in the 36-semester-hour program. (The one exception
is the case of students who select one or more fields in histor
take nine hours of second-group courses in the 30-hour p
12 in the 36-hour program.) No work counted toward a bache
may also be counted toward a master's degree.

All work for a master's degree must be completed in five y
an extension of time is granted by the dean. A student who is
unable to continue the program of studies may request a leave
not to exceed one year.

No credit is granted for work done *in absentia* or without form
tion, except for the thesis, which may be completed *in absenti*
permission of the curriculum advisor and the dean. No mor
semester hours of graduate credit may be transferred from
credited institutions or another division of the University, and
be accepted only under limited conditions of time, grades, and
to the student's program.

A student who expects to continue studies for the degree of
Philosophy in the field of International Relations after rec
master's degree in the field of International Affairs is strongly
plan from the beginning so that work for the lower degree will
subsequent doctoral program in the Graduate School of Arts and
(see pages 90–94, 98–100).

Tool Requirements

In most programs of study a candidate for the degree of Master
must demonstrate a reading knowledge (certified by the appropr
guage department) of at least one modern foreign language, to be
by the dean. A master's degree candidate whose native langua
English may not select the native language to meet the tool re
the candidate may select English to fulfill the requirement
approval of the advisor and the dean. The examination, which
high-level reading and writing proficiency, is administered by th
for International Students program.

Candidates in the field of Public Affairs and in the field of Scien
nology, and Public Policy may substitute statistics for a foreign l
This requirement may be met by demonstration of proficiency
level of Stat 105, 112 or 197.

Candidates in the field of International Affairs may petition the
substitute statistics for a foreign language. The primary basis for
ing such petitions will be the relevance of the statistical skills
student's thesis research.

The language or tool examination should normally be taken be
student has completed the first 15 hours of work. No student may
examination more than three times.

Courses taken to fulfill the tool requirement are not counted
semester-hour requirement for a master's degree.

's Comprehensive Examination

ition to any course examinations, the candidate must pass a written 's Comprehensive Examination. Examinations are scheduled twice (usually in November and April), and should be taken during the last er of course registration or shortly after the completion of the pre- d course work. If there is a lapse of time between completion of e work and the examination, the student must maintain continuous ration during this period. The candidate must consult with the or, well in advance, as to the date of the examination and the defini- of the subject-matter fields which this examination is to cover. It d be understood, however, that course work constitutes only partial ration for the Master's Comprehensive Examination. Each student o expected to pursue a program of additional reading in each of the ed fields, in accordance with the advice of the faculty member nsible for instruction in that field. **An oral examination on the thesis** ajor report **may also be required.**

larship Requirements

les for graduate work are *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, *I*, Incomplete; *W*, Authorized Withdrawal; and *CR*, Credit.
average of *B* **or better is required for the master's degree. The grade** is not considered as failing but must be counterbalanced by a grade in a graduate course of equal status.
master's candidate who receives a grade of *F* is required to present e for consideration by the Dean's Council as to why the student should llowed to continue in the program of studies.
henever a grade has not been assigned, the symbol *I* (Incomplete) or symbol *W* (Authorized Withdrawal) will be recorded. The symbol *I* ates that a satisfactory explanation has been given to the instructor he student's failure to complete the required work of the course. pt for thesis research courses, an "Incomplete" cannot be made up the lapse of one calendar year. An "Incomplete" which is not re- d by the end of one calendar year remains as a grade of *I* on the nt's record. An "Incomplete" cannot be removed by reregistering for ourse.

hesis

hesis subject should be selected as early as possible so as to permit ive integration with the course work.
subject must be approved by the student's advisor and the member Faculty under whom the thesis is to be written. The thesis in its final must have the approval of the thesis director and one other reader, wo copies must be presented to the dean by the student no later he date announced in the Calendar. Printed copies of detailed regu- s regarding the form and reproduction of the thesis are available in fice of the dean.
ment of tuition for the thesis entitles the candidate, during the period istration, to the advice and direction of the thesis director and the reader. In case a thesis is unfinished, an additional calendar year

may be granted without further tuition payment. The st
ever, maintain continuous registration (see page 49) duri
the preparation of the thesis extends beyond the additio
the student must register for the entire six hours of thes
tuition as for a repeated course.

Fields of Study

Specific requirements for each of the six fields of stud
degree of Master of Arts are listed below. For prerequ
mission Requirements," pages 174–75.

EAST ASIAN STUDIES

The Master of Arts in East Asian Studies is an interdiscip
which includes course work from at least four of the follow
Chinese language and literature, economics, geography, hist
cal science.

The degree program consists of 30 semester hours of cours
ing six hours of thesis research, or 36 semester hours o
without a thesis. Each candidate must pass a Master's
Examination in one major and one or two minor fields. To
requirement candidates must demonstrate proficiency in
or Japanese language; with the permission of the dean, anoth
language may be substituted. (As preparation for this r
special Chinese language course will be available to stu
program.)

Only the 30-semester-hour thesis option is available to stud
a concentration in Chinese language and literature. That prog
12 semester hours of Chinese language and literature, six hou
six hours of electives selected in consultation with the adv
hours of thesis research.

INTERNATIONAL AFFAIRS

The interdisciplinary program leading to the degree of Master
the field of International Affairs provides the student with a wi
fields within three broad areas of study: general, supplemental
and regional. Graduate courses in anthropology, business adm
economics, geography and regional science, history, politic
psychology and sociology relate to these fields, which are listed

General Fields of Study—International politics, comparat
ment and politics, modern political theory (including socialis
munist theory) and international economics.

Supplementary or Special Fields—International law; inter
ganization and administration; international economic develop
national communications; international and comparative aspe
munism; U.S. diplomatic history; U.S. foreign policy; science
and public policy; 20th century British defense and foreign polic
national security policy.

nal Fields—Modern history, or government and politics, or eco-
istory and problems of one of the following: Western Europe, East-
pe, the Soviet Union, Latin America, the Middle East, Africa, South
theast Asia and China. Within each geographical area there are
y three fields of study available.

degree candidate must select at least one general field. The fields
also represent at least two disciplines. Beyond these limits, the
is free to select any of the fields indicated above as long as they
e a coherent program. Courses should be chosen with a view to
evance to the selected fields. Candidates will be examined on their
fields of study in the Master's Comprehensive Examination.

idates who elect to write a thesis must choose *three* of the listed
nd take, in addition to the thesis, a minimum of 24 semester hours of
e course work in at least two departments, with no more than 15
n any one department.

idates electing a program without a thesis must choose *four* fields
y take no more than 21 of their required 36 semester hours in one
ent. They must also include in their program at least two re-
seminars (six semester hours) requiring the preparation of sub-
research papers.

AMERICAN STUDIES

ogram leading to the degree of Master of Arts in the field of Latin
can Studies is designed to provide the student with an appropriate
ackground in three or four of the following fields: anthropology,
mics, geography and regional science, Hispanic literature, history,
olitical science.

degree candidates must complete 12 semester hours of graduate
including the interdisciplinary seminar (287), in a major field selected
hose listed above, and six semester hours in each of two minor
selected from those listed above. Students who elect not to write a
must take six semester hours in a third minor field selected from
listed above, or from the fields of urban and regional planning,
mic development or population studies. The student must further
lete an additional six semester hours in any of the major or minor
selected. The tool requirement must be satisfied by demonstration
oficiency in Spanish or Portuguese, or in English if the student's
language is Spanish or Portuguese. The Master's Comprehensive
nation will cover all the student's selected fields.

C AFFAIRS

rogram leading to the degree of Master of Arts in the field of Public
rs allows the student to specialize in either domestic economics or
stic politics. The student may select courses in consultation with an
or to emphasize either political science, economics, or American
y, provided (1) that no more than 15 hours of courses are elected
e department under the 24-hour program with a thesis, or (2) that no
than 21 hours are elected in one department under the 36-hour pro-

gram without a thesis. Course work may include economics (public monetary theory and policy, labor economics, industrial organ natural resources and environmental economics, regional and urb nomics, economic policy); history (U.S. political history, U.S. ec history, recent U.S. history); political science (domestic politics a ernment, Congress and the presidency, U.S. constitutional law and p state and urban politics, political science research methods, and s technology, and public policy).

RUSSIAN STUDIES

This degree program is designed to give the student a broad gr Russian affairs on an interdisciplinary basis, with emphasis on the era. At the same time, the program provides an opportunity for st to gain knowledge of a special area of interest within the subject as a whole.

Required for the degree: 30 semester hours including a thesis, semester hours without a thesis. Each candidate prepares for a Ma Comprehensive Examination in one major and two minor fields from the areas of internal affairs, foreign relations, political thou theory, literature and culture, and economics and geography. Russia guage proficiency must be demonstrated in a reading comprehe examination before the Master's Comprehensive Examination is ta

SCIENCE, TECHNOLOGY, AND PUBLIC POLICY

The program leading to the degree of Master of Arts in the field of sc technology, and public policy is flexible and is carefully planned an ducted in consultation with an advisor. All degree candidates are re to take 12 semester hours in the core field of science, technolog public policy, which includes course work both in science policy policy analysis. A second field must be chosen from one currently in the international affairs or public affairs programs of the School dents who elect to write a thesis must select one additional field, and who elect not to write a thesis must select two additional fields. The and fourth fields may also be chosen from those currently offere international affairs or public affairs, or may be interdisciplinary, deve in consultation with the advisor and focusing on a particular policy or area. Such a special field must be approved by the student's advisor the dean.

SPECIAL PROGRAMS

Combined Master of Arts and Juris Doctor Degree Program

The School of Public and International Affairs cooperates with the tional Law Center in offering a program leading to the combined deg of Master of Arts and Juris Doctor. A student must be accepted for mission by both the School of Public and International Affairs and

ational Law Center. Applications should be made separately, but at
e same time. Both the School and the Center should be notified that
e student is interested in the combined program. The student will be
mitted to the School of Public and International Affairs for the academic
ar following the first year of study at the National Law Center, since
e National Law Center stipulates that the first year of coursework for
e Juris Doctor degree must be taken as a unit.

The Master of Arts degree program normally consists of the 30-semester-
our program which includes a thesis. The student selects a major offered
the School and fulfills all of the requirements for the Master of Arts
egree as well as fulfilling the requirements for the Juris Doctor degree.
p to six semester hours of credit for course work completed as part of
e Juris Doctor curriculum and related to the student's degree program
ay be approved for transfer toward the Master of Arts degree. (Some
the course work required for the Master of Arts degree program
ay be applicable toward the Juris Doctor degree requirements.) Students
ill be registered in both the School of Public and International Affairs
d the National Law Center and must maintain this concurrent registra-
on until all degree requirements have been completed. All work for this
mbined degree program must be completed in five years, unless an
tension of time is granted by the dean.

stitute for Sino-Soviet Studies

e Institute for Sino-Soviet Studies provides a program of specialized
aduate study and research within the School of Public and International
fairs. Courses of the Institute are drawn from a variety of academic
eas and thus provide an interdisciplinary approach to the study of the
oviet Union, Eastern Europe, and East Asia, and of the Communist move-
ent within and among the countries of these areas. Faculty members
nduct seminars and reading courses in the disciplines of economics,
ography, history, language and literature, law, political science, and
chology. Research work is integrated with the teaching program.
tudents who are preparing for the degree of Master of Arts in the fields
East Asian studies, international affairs, and Russian studies in the
ool of Public and International Affairs, or for the degree of Master
Arts in the fields of economics, history, or political science in the Grad-
e School of Arts and Sciences, with specialization in Sino-Soviet
dies, may take one-half of their course work from the Institute's course
rings.

tudents working toward the degree of Doctor of Philosophy in interna-
al relations with special emphasis on the Sino-Soviet area are expected
ombine work in the Institute with work in the fields of economics,
ory, and political science. Doctoral candidates in the field of political
nce will take their Sino-Soviet work in the form of appropriate sub-
s of the major and minor fields. Doctoral candidates in the field of
ory are expected to take at least two of the four fields for the degree
e history of the countries of their specialization. All work leading to
degree of Doctor of Philosophy is under the general supervision of the
duate School of Arts and Sciences and consultative committees
gnated by that School which direct the work of each graduate student

upon admission to degree candidacy. A faculty member of th
will serve as advisor to the candidate. The candidate's committ
formed from members of the selected disciplinary departmen
didate for such a degree should assume that the committee w
the substitution of a reading examination in Chinese or Russia
of the two Western languages normally required for the degree.

A brochure describing in more detail the work of the In
available upon request.

War College Program

The School of Public and International Affairs offers an off-cam
gram at the National War College leading to the degree of M
Science in International Affairs. Admission is limited to selected
of the faculty and student bodies of the War College.

The program of study is complementary to that portion of t
College's curriculum pertaining especially to international relati
foreign policy.

DIVISION OF UNIVERSITY STUDENTS

Dean J.G. Allee, Jr.
Assistant Dean B.K. Netland

DEAN'S COUNCIL*

J.G. Boswell, H. Kenyon, R.W. Kenny, L.G. Schwoerer

INTRODUCTION

The Division of University Students was established in 1930 to ma
regular course offerings of the University more generally available to
bers of this metropolitan community and to others who are not at the
candidates for degrees in this University. In this Division are reg
students who wish to undertake university courses for credit
auditors. University Students, often employed in government or ind
may be taking courses to increase their vocational fitness or to
themselves on new developments in the arts and sciences. They ma
taking courses as a matter of personal interest for cultural enrich
Such students may be candidates for higher degrees in other institu
sent here for special work as part of a graduate program. They ma

* The Vice President for Academic Affairs and the Dean and Assistant Dean of the Divi
ex officio members of the Council.

Undergraduates, matriculated in other colleges, taking summer sessions courses only or courses for transfer during the regular academic year with approval of their own institution. They may be students from institutions outside the Washington metropolitan area enrolling in an appropriate "Washington Semester" program. To serve members of such groups and others not enrolled in degree-granting branches of the University is the function of the Division of University Students.

The privilege of attending George Washington University as a non-degree student is granted on the basis of maturity and proper preparation. Because no degree at George Washington University is involved, there can be no meaningful advisory system in the Division. However, students are invited to seek advice from academic departments. University students are urged to apply to the Office of Admissions for transfer to degree-granting branches whenever such action is appropriate.

All courses except those restricted to medical and law students and those limited to specific degree candidates are open to students in the Division of University Students. Students wishing to take Engineering and Applied Science courses should consult the *School of Engineering and Applied Science Bulletin*.

Registration in a given course may be denied students in this Division when space is needed for degree candidates. Students in this Division are not eligible to register for independent study or thesis or dissertation research.

An applicant who has been denied admission to any degree-granting branch of the University will not be considered for admission to the Division of University Students for the semester for which the applicant was denied, except upon written recommendation of the dean of the college or school that denied the applicant. However, an applicant who has been denied may be considered in subsequent semesters.

Nondegree students who have not completed a bachelor's degree may not enroll in graduate courses offered by the School of Government and Business Administration.

An applicant who has been suspended from any educational institution for poor scholarship will not be considered for admission to the Division of University Students for one calendar year after the effective date of the suspension.

ENTRANCE REQUIREMENTS*

Good character and an academic background appropriate for the program of studies contemplated are required.

A person not working for a degree at this University will be considered for admission to the Division of University Students to take courses for which the applicant has adequate preparation, as determined by the departments concerned.

Although the deadline for applications for admission to the Division of University Students is the Friday before the first day of registration (see pages 5–7), applicants are urged to apply earlier because no special ex-

* For admission requirements for students from foreign institutions, see pages 25-27.

ceptions can be made to permit registration after the last day fo
classes (the end of the first week of classes) even though the req
credentials, records, and test scores may delay the action on an ap
for admission. Insofar as time for full processing permits, app
submitted after the deadline may be considered.

Applicants who have graduated from high school within the p
two calendar years must pass designated aptitude tests or subm
certificate of graduation from an accredited secondary school s
at least 15 units* including four years of English; at least two y
one foreign language; two years of science, preferably with lab
instruction; two years of social studies, one of which must be Am
history; and two years of college preparatory mathematics; (
principal's statement that the student is prepared to undertake c
work; and (3) scores on the College Entrance Examination Board's
lastic Aptitude Test and English Composition Achievement Te
addition to these records, applicants who have been subject to any
of academic or disciplinary action at any college or university
the previous calendar year must submit scholastic records from
college or university. Applicants for the Secondary School Honors
gram and applicants who have not completed high school or the equi
must submit scholastic records and may be required to take desi
aptitude tests.

Scholastic records may be required of applicants who have attended
college or university within the previous calendar year, former st
of this University who were on probation or suspended and who
since attended another college or university, and applicants who
ever been subject to academic or disciplinary action. When sch
records are required, such students may be admitted for one semes
summer term only, under provisions stated by the Office of Admi
and pending receipt of academic records.

REGULATIONS

Regulations concerning admission, registration, fees and finances are
on pages 20–34; other University regulations, on pages 45–53.

Prospective and registered students are urged to acquaint themse
with the regulations concerning attendance (see page 45) and withdr
(see page 47).

The following specifically apply to all students in the Division of
versity Students:

Last day to add a class for credit—end of first week of classes.

Last day to drop a class for credit or withdraw from the Univers
end of the ninth week of classes.

Equivalent amounts of time apply to the summer sessions.

Academic Work Load

The normal academic work load is not more than 10 hours for a stud
employed more than 20 hours a week and not more than 18 hours fo

* A unit represents a year's study in a secondary school subject, including in the aggregate
less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

l-time student. (Hours for courses graded *I*, "Incomplete," will be in-uded in subsequent academic work load.) Exceptions to those limits ust be approved by the dean.

holarship Requirements

student who fails to maintain the scholarship requirements of this vision may be dismissed from the University.

Normally, any course may be repeated for credit. All grades received the Division of University Students remain on the record, and scholar-ip requirements are based on the total record. A course taken for audit ay not be repeated for credit.

RADES

Undergraduate—*A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, ail; *I*, Incomplete; *W*, Authorized Withdrawal.

Graduate—For graduate work, grades are indicated as *A*, Excellent; *B*, ood; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal.

The credit/no credit option, which permits students to take courses in hich they receive the grade of either "Credit" or "No Credit," is not vailable to students registered in the Division of University Students.

NCOMPLETE/AUTHORIZED WITHDRAWAL

onditions under which the grades of *I* (Incomplete) and *W* (Authorized Withdrawal) may be assigned are described on page 46.

Removing an Incomplete—Although the grade of *I* may remain on the tudent's record indefinitely, the instructor should normally set a period naximum of one year) within which the uncompleted work (usually the nal examination or a required paper) must be made up. The grade of *I* nnot be removed by reregistering for the course here, or by taking its uivalent elsewhere. An "Incomplete" cannot be made up after the lapse one calendar year except by written permission of the Dean's Council. "Incomplete" which is not removed within one calendar year remains as grade of *I* on the student's record.

OBATION AND SUSPENSION

tudent not holding a degree is subject to the probation and suspension ulations of Columbian College of Arts and Sciences (see page 71).

A student holding a degree must maintain a cumulative quality-point dex of 3.00 or the equivalent (a *B* average) in second-group or higher el courses. If the cumulative index in second-group or higher level rses falls below 3.00, the student will be placed on probation. If the mulative index in second-group or higher level courses falls to 2.25 or w, the student will be suspended. The scholarship regulations for -group course work are the same as those of Columbian College of s and Sciences (see page 71).

suspended student will not be permitted to register for any course

work, either for credit or for audit, in the Division during the p
suspension.

Changes in Program of Studies

Changes within the Division of University Students—A student
change or drop courses (see "Withdrawal," page 47) or change s
that of auditor except with the approval of the dean.

Change from one section to another of the same course may b
with the approval of the dean and the department concerned.

Transfer within the University—Transfer to or from the Division
versity Students may be made only with the approval of the dean
cerned.

Application for transfer to degree candidacy will be considered
after the completion of at least one semester in the Division of Uni
Students or upon request from the college or school to which the st
is seeking admission.

The student wishing to transfer to degree candidacy must meet the
ditions of the college or school to which the student is applying. It
responsibility of the student to consult the relevant degree-granting c
or school concerning all conditions to be met and the amount of
transferable.

SECONDARY-SCHOOL HONORS PROGRAM

The outstanding secondary-school student in the Washington metrop
area who wishes to enrich an academic background and participa
stimulating college work is encouraged to seek admission to G
Washington University's Secondary-School Honors Program. Honor
dents are enrolled in regular college courses of their own choosing a
priate to their level of study, background, and aptitude as deter
through consultation with high school counselors and advisors
University.

Credit earned in the Program is applicable toward a degree at G
Washington University should the student later matriculate here
transfer of credit elsewhere depends upon the policies of the ind
schools to which the student might later apply.

Admission to the Honors Program is highly competitive. Normally
15 students a semester will be admitted to this Program, and each s
will receive a scholarship totaling 50 per cent of tuition (excluding
tory and University Center fees). Admission is for one semester on
students doing well will be given preference for continuation and
be readmitted for a second semester. Criteria for admission are
on a transcript of the student's grades to date, available test sc
evidence of emotional and intellectual maturity, and the results o
interview with the director.

Application forms and further information may be obtained from
Netland, Director of the Secondary-School Honors Program, Divisio
University Students, George Washington University, Washington,
20052. No applications will be considered after the Friday before the
day of registration for the semester concerned. For application for
summer session see the *Summer Sessions Schedule*.

DIVISION OF EXPERIMENTAL PROGRAMS

Director R.S. French

The University is committed to the continuous development of new curricular options for its faculty and students. The Division of Experimental Programs has as its function the support of such curricular experimentation and development. This University-wide curricular development program has three objectives: (1) a more direct relationship between campus and off-campus resources and interests; (2) cooperation among the academic divisions of the University in the development and sponsorship of new courses and programs; and (3) experimentation with new ways of teaching and learning.

Under the auspices of the Division of Experimental Programs, students, faculty, and administrators throughout the University are involved in the planning, teaching, and evaluating of experimental courses and programs. Many curricular experiments which receive financial support through the Division of Experimental Programs are sponsored by other academic units of the University. There are presently two academic programs directly sponsored by the Division—the Program in Experimental Humanities and the Service-Learning Program.

The Program in Experimental Humanities offers courses which provide opportunities for students to combine sustained field study with classroom work. These courses are sometimes taught by interdisciplinary and interdivisional faculty teams.

The Service-Learning Program integrates supervised work-study with classroom seminars. Students in the Program are assigned to community groups, research organizations or governmental agencies. Assignments are arranged by means of a formal agreement among the student, the Program, and the off-campus agency.

The Division of Experimental Programs is charged with mobilizing academic resources throughout the University that can appropriately address needs in Washington communities, particularly the communities of poverty. Among the activities of the Division is a technical assistance program in the Congress Heights-Anacostia area, co-sponsored by the Anacostia Community Development Consortium. The Division, in conjunction with the Spanish Education Development Center, places bilingual students in the Spanish-speaking inner city. It also offers stipends to selected students for work in community agencies.

ASSOCIATES

Neil Seldman, *Assistant Director*
Jerry Wallace, *Assistant Director*
Allan Fitzsimmons, *Faculty Associate for Environmental Studies*
Margot Kernan, *Faculty Associate for Film Studies*
Colin Turnbull, *Faculty Associate for Community Studies*

STEERING COMMITTEE

Harold Frederick Bright, *Provost and Vice President for Academic Af*
Chairman
Lawrence Thompson Bowles, *Dean for Academic Affairs of the Me*
Center
Marcella Brenner, *Professor of Education*
Carl James Lange, *Associate Professor of Psychology; Assistant Vice P*
dent for Administration and Research
Ralph Clarke Nash, *Professor of Law*
Judith Ann Abrams Plotz, *Associate Professor of English*
Henry Solomon, *Professor of Economics; Dean of the Graduate Scho*
Arts and Sciences

THE SUMMER SESSIONS

Dean W.F.E. Long
Assistant Dean S.R. Paratore

During the summer of 1978, Columbian College of Arts and Sciences, G
Graduate School of Arts and Sciences, the School of Government
Business Administration, the School of Public and International Affa
the School of Engineering and Applied Science, the Division of Univer
Students, and the School of Medicine and Health Sciences offer cours
one three-week session (May 15-June 7) and two five-week sessi
(June 12-July 18 and July 20-August 24). The National Law Center o
courses in two six-week sessions and one 13-week session; the School
Education and Human Development offers courses in six- and nine-we
sessions and three three-week workshop sessions. The University a
offers special programs during the summer which are not available dur
the regular academic year. Courses are offered during both day and ev
ning hours.

Students who are enrolled at the University for the 1978 spring semes
may register for the Summer Sessions without special application. A
others must apply for admission or readmission. Those who do not wi
to work toward a degree at the University may apply through the Divisio
of University Students to take courses for which they are academically pre
pared (as determined by the departments concerned). Students who wish
degree status may seek admission from the appropriate college or schoo
within the University, and must meet the stated entrance requirements.

For a complete statement concerning summer term work, see the *Sum*
mer Sessions Schedule.

OFFICE OF THE VICE PRESIDENT FOR POLICY STUDIES AND SPECIAL PROJECTS

Vice President L.H. Mayo

The Vice President for Policy Studies and Special Projects is responsible to the President of the University for developing an interdisciplinary capability for analyzing national policy issues. There is involvement with the Consortium universities and with foundations, federal agencies, industry, and other organizations which interact with the governmental process.

The office serves the University as a locus for discussion and as an advisory resource on interdepartmental and interdisciplinary research related to the analysis of public policies, and on curricula pertaining to broad social or environmental problems.

The University has sustained an institutional commitment, in terms of faculty recruitment and program emphasis, to issue-oriented policy analysis as a major focus of teaching and research activities. The result of twelve years of development is a significant, institutional capability for comprehensive analysis of complex policy issues. Major programs oriented to public policy and governmental functions, which come within the ambit of this office, are described below.

ROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

irector L.H. Mayo

he Program's primary objective is the continuing development of a niversity-wide policy research capability related to problems stemming om the impact of technological change on the processes, values, and stitutions of society. The Program provides a neutral forum for considera- on of these policy issues—whether in a retrospective, current, or pro- ective context—and provides an advisory and research resource for licy makers in the public and private sectors.

The Program's primary components are:

1. *The Technology Assessment Group*—The Program has been closely volved with the evolution of the concept of Technology Assessment A), which has become federally institutionalized in the Congressional ice of Technology Assessment. Much of the early work of the Program sisted of theoretical, methodological, institutional, and historical dies. During the last six years, however, the TA Group has carried out dies in a variety of subject areas including transportation, energy, mmunity development, environmental noise, communication, and gov- mental structure and process, under contracts or grants from most of major Federal agencies.

. *The Graduate Program in Science, Technology, and Public Policy*— s Master's degree program—co-sponsored by the Program of Policy dies and the School of Public and International Affairs (SPIA)—combines

graduate training in science policy analysis with major research u
takings. In six years, the program has become the largest degree-gra
science policy program in the United States. Admissions informat
contained in the SPIA section of this Bulletin.

3. *The Behavioral Studies Group*—This part of the Program fo
on the social and behavioral factors associated with technol
development. It is a multidisciplinary group, with expertise in motiva
and behavioral aspects of technology assessment in the areas of tran
tation, energy use, communication, energy conservation, new town
gram development, public health (family planning, community m
health), and education. Work includes applications of TA to progra
velopment and evaluation, as well as to dissemination and utilizati
strategies to improve the constructive uses of technologies in these a

The Program of Policy Studies normally has between 15 and 20 pr
sionals and many students working on several projects, most of w
are problem-oriented and interdisciplinary in nature. Members of
faculty, graduate students, members of governmental agencies, and sp
consultants are regularly involved in our studies. To date the Prog
has performed over 75 policy studies and has published over 100 rep
monographs, books, and special papers which have been distributed
professionals and institutions throughout the world. Funding for
Program's activities has come from a variety of sources: the Univers
federal agencies, including DOT, EPA, ERDA, HEW, HUD, NASA, C
merce, OTA, and NSF; and private foundations, including The
Foundation.

Professional Associates

Director Louis Mayo, *Vice President for Policy Studies and Special*
ects; Professor of Law
Associate Director Vary Coates, *Senior Staff Scientist and Dir*
Technology Assessment Group (Political Science)
Betsy Amin-Arsala, *Consultant (Community Development)*
Robert Anthony, *Senior Staff Scientist (Physics, Systems Modeling)*
Guy Black, *Professor of Business Economics*
James Brown, *Senior Staff Scientist; Professor of Law*
Richard Ericson, *Senior Staff Scientist; Professor of Management*
Henry Hitchcock, *Research Associate (International Relations)*
Charles V. Kidd, *Senior Staff Scientist (Public Affairs)*
Ursula Kruse-Vaucienne, *Research Assistant and Director, U.S./U.S.*
Science and Technology Exchange Project
John Logsdon, *Research Scientist; Director, Graduate Program in Scie*
Technology and Public Policy; Associate Professor of Public Affairs
Political Science
Joseph Margolin, *Senior Staff Scientist; Director, Behavioral Studies Gro*
Milton Marney, *Consultant (Normative Systems Research)*
Marion Misch, *Research Scientist; Deputy Director, Behavioral Studi*
Group
Henry Nau, *Graduate Program in Science, Technology and Public Polic*
Assistant Professor of Political Science and International Affairs

Herman Pollack, *Senior Staff Scientist (Political Science)*
Edward Studholme, *Manager, Airport Noise Reduction Policy and Planning Study*
Albert H. Teich, *Deputy Director; Associate Professor of Public Affairs*
Ernest Weiss, *Senior Staff Scientist (Transportation Programs Specialist)*
Frederick B. Wood, *Research Scientist (Management)*
Benjamin Woodbury, *Research Associate, Graduate Program in Science, Technology, and Public Policy (International Science and Technology Policy)*

HEALTH STAFF SEMINAR

udith Miller, *Director*

The Health Staff Seminar is designed to assist professional staff members mployed by the executive and legislative branches of the federal govern- nent in the health field to obtain a more realistic understanding of actual ealth practices and problems, and to improve communications between Vashington-based professional staff members and experts in the field. xposure to problems and issues facing the entire country is gained rimarily through sequenced evening discussions or workshops and, here appropriate, site visits to various localities. Although attendance primarily limited to Congressional aides and top-level health staff from e many government agencies involved in health, GWU students and culty can be accommodated on a space-available basis.

STITUTE FOR EDUCATIONAL LEADERSHIP

rector Samuel Halperin
sociate Director Elizabeth Lambert Johns
rector, *Education Policy Fellowship Program* Paul Schindler
rector, *Educational Staff Seminar* Alice Kinkead
ordinator, *The Associates Program* Philip Kearney
ector, *Postsecondary Education Convening Authority* Kenneth C. Fischer
ecutive Producer, *"Options in Education"* John Merrow
ordinator, *Washington Policy Seminar* George Kaplan
ector, *Family Impact Seminar* A. Sidney Johnson III
ordinator, *Ford Fellows in Educational Journalism* Diane Brundage
ordinator, *Education of the Handicapped Policy Project* Lisa Walker
ief Administrative Officer Dietra Norris
dget Officer Catherine Arnold

he Institute for Educational Leadership (IEL) seeks to strengthen sent and potential leadership in American education at the policy levels tate and federal government. Established in 1971, IEL is a policy plan- g and coordinating agency for a number of related educational pro- ms, including Education Policy Fellowship Program, Educational Staff

Seminar, The Associates Program, Postsecondary Education Conve
Authority, "Options in Education" over National Public Radio, Washi
Policy Seminar, Faculty Impact Seminar, and Ford Fellows in Educat
Journalism. IEL is supported by a major grant from The Ford Found
and by various grants from foundations and federal agencies.

The objectives of the Institute are carried out under the following
grams and activities:

1. *Education Policy Fellowship Program* (formerly Washington In
ships in Education) is a national program designed to help provide f
educational leaders with skills in policymaking for effective and
lightened leadership. Funds for the program are provided by the F
Rockefeller, and Cleveland Foundations. Since 1965, the program
placed over 360 mid-career persons in one-year internships in public
private agencies involved in educational policy matters.

2. *Educational Staff Seminar* is a professional development pros
designed for staff members employed by the executive and legisl
branches of the federal government in the field of education. It is desig
to expose these federal education policymakers to existing progr
throughout the nation, and to innovations, research, and emerging i
in the field.

3. *The Associates Program* is an evolving IEL activity. Its empl
up to now has been to provide seminars for legislators and other po
makers at state capitals. Begun in 1972 with three state educati
seminars, the Program now sponsors 22 seminars, all directed by As
ates who arrange five to ten programs annually.

The Program maintains a network of state-level "generalists" (Ass
ates) whose ties to IEL in the nation's capital provide rare linkages a
federal and state education policy-setters. It also sponsors national
regional conferences dealing with state-level responsibilities in educ

4. *The Postsecondary Education Convening Authority* was estab
under a grant from the Department of Health, Education, and We
fund for the improvement of postsecondary education. It functions
issue-development service for consideration and transmission of
policy issues in postsecondary education. Conferences, research ef
task force groups, and publications are sponsored, which focus on
issues as institutional licensing, consumer protection, state financing
adult learning.

5. *"Options in Education,"* co-produced by IEL and National Pub
Radio, is a weekly series heard over most of NPR's 190 member sta
from coast to coast. Voice of America rebroadcasts the one-hour
grams, and IEL makes cassettes and transcripts available at minimum c
"Options" has received awards from the National Association of S
Department of Education Information Officers (1977), the Educa
Writers Association (1975 and 1976), and the Council for Advancem
and Support of Education (1974). A list of NPR member stations an
catalog of available cassettes and transcripts are available from IEL

6. *Family Impact Seminar* seeks to identify and assess the effect o
families and children of a variety of public policies. The Seminar and
its several task forces are composed of scholars and policymakers. T
gether, they examine and test the feasibility of developing "family impac

statements" on selected government policies and programs. The specific issues to be examined are selected from a broad range of existing or proposed public policies.

7. *Ford Fellows in Educational Journalism* is an intensive, short-term professional development program for educational reporters and journalists. This pioneering effort offers nine Fellows a "sabbatical" from the fast-paced immediacy of daily educational reporting and allows them to pursue a full-time, four-month course of independent study in their designated area of educational interest. The program reflects the conviction that better-informed media will be a direct and positive influence for better education.

8. *The Washington Policy Seminar* brings groups of state educators and policymakers to the Capital for three days of intensive exposure to the processes, people, and institutions which shape federal education policy. Speakers for the Seminar include members of Congress, Congressional staff, senior officials of the Executive branch, leaders of education associations, and seasoned "Washington watchers."

For further information on any of the above programs, please contact the Institute for Educational Leadership, 1001 Connecticut Ave., N.W., Washington, D.C. 20036.

SPONSORED RESEARCH

Vice President for Administration and Research C.J. Lange

These special programs were established for the specific purpose of considering, in an academic atmosphere, problems proposed by the individual projects or submitted by the sponsoring agency. Cooperation between these programs and the various departments of instruction is as close as the nature and needs of the programs and departments will permit.

CENTER FOR SOCIAL POLICY STUDIES

Director Sar Levitan

The Center for Social Policy Studies is devoted to the evaluation of federally-supported manpower, antipoverty and related programs. The center is financed by a grant from the Ford Foundation and offers, in connection with the Department of Economics, graduate courses in labor economics and social policy.

EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC) CLEARINGHOUSE ON HIGHER EDUCATION

Director Jonathan Fife

The Educational Resources Information Center (ERIC) Clearingho on Higher Education, established in the fall of 1968, is supported by National Institute of Education. The Clearinghouse is responsible for acquisition, evaluation, abstracting, indexing and dissemination of resea reports and other documents dealing with problems and issues in hi education, prepares state-of-the-art and review papers related to hi education and responds to individual inquires concerned with higher cation.

HEALTH STAFF SEMINAR

See Office of the Vice President for Policy Studies and Special Proje page 191.

INSTITUTE FOR EDUCATIONAL LEADERSHIP

See Office of the Vice President for Policy Studies and Special Proje pages 191–93.

INSTITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

Director W.H. Marlow

The Institute for Management Science and Engineering provides a disciplinary environment for innovative graduate teaching and substa opportunities for research activities and public service under divers sources of external support. Through its Program in Logistics, the Insti performs research leading to the development of a science in logis featuring principles and methodology for resource allocation problems civil affairs and national defense efforts.

MID-EAST REGIONAL RESOURCE CENTER

Director Raymond Cottrell
Associate Director Nona Flynn

The Mid-East Regional Resource Center is one of a number of center serving under contract to the Bureau of Education for the Handicapped U S. Office of Education. The area served includes Delaware, Maryland West Virginia, and North Carolina. The primary mission of the project is to assist state education agencies and affiliated agencies within its area to comply with the Individualized Educational Programming requirements of Public Law 94-142.

ATURAL RESOURCES POLICY CENTER

irector Mary Holman

he Natural Resources Policy Center was established in September, 1965, sponsor faculty and student research in the area of natural resources and nvironmental quality; to develop and undertake activities that promote ndergraduate and graduate education; and to train employees of public source agencies. The program of the Center focuses particularly on creasing the contribution of the social sciences to the solution of con- mporary problems relating to the management and development of natu- l resources. The Natural Resources Policy Center, which provides a focus n natural resource and environmental quality problems and issues, is n integral part of the Department of Economics in both the design of its esearch program and its courses.

ROGRAM OF POLICY STUDIES IN SCIENCE AND TECHNOLOGY

e Office of the Vice President for Policy Studies and Special Projects, ges 189–91.

CIAL RESEARCH GROUP

ector Ira Cisin
sociate Director H.J. Parry

e Social Research Group conducts surveys and experiments with con- ntration on basic research underlying an approach to the solution of ial problems.

COURSES OF INSTRUCTION

The following pages contain listings and descriptions of courses offered
the departments of instruction and special interdepartmental programs.
courses as here listed are subject to change. The University reserves
right to withdraw any course announced or to change the course
shown herein.

HOURS OF INSTRUCTION

Classes are scheduled in the morning, afternoon, and evening. Even
and daytime sections of the same course are identical, are taught by
same staff of instructors and carry the same amount of credit.

EXPLANATION OF COURSE NUMBERS

First-group courses—Courses numbered from 1 to 100 are planned
students in the freshman and sophomore years. With the approval of
advisor and the dean, they may also be taken by juniors and seniors.
certain instances, they may be taken by graduate students to make
undergraduate deficiencies or as prerequisites to advanced courses,
they may not be taken for graduate credit.

Second-group courses—Courses numbered from 101 to 200 are planne
for students in the junior and senior years. Except for accounting course
they may be taken for graduate credit only upon the approval of the De
and the instructor at the time of registration. Such approval is grant
only with the provision that students must complete additional work
receive graduate credit. Accounting courses numbered 101-200 may
be taken for graduate credit.

Third-group courses—Courses numbered from 201 to 300 in the Graduate
School of Arts and Sciences and the School of Government and Business
Administration, and courses numbered 201 to 400 in the School of Edu
cation and Human Development, are planned primarily for graduate stu
dents. They are open, with the approval of the instructor, to qualified
seniors; they are not open to other undergraduates. Qualified seniors
the School of Government and Business Administration registering for these
courses must have a 3.00 average, the prior approval of the departmen
chairman who is responsible for the graduate course, and the prior approv
of the dean. Non-degree students who have not completed a bachelo
degree may not enroll in graduate courses offered by the School of Govern
ment and Business Administration.

Fourth-group courses—Courses numbered 301 to 400 in the Graduate
School of Arts and Sciences are limited to graduate students, but they are
primarily for doctoral candidates. Courses numbered 301 to 400 in the
School of Government and Business Administration are limited to doctoral
students. In the School of Education and Human Development fourth-group

courses, numbered 401 to 500, are limited to graduate students with master's degrees from accredited institutions.

Fifth-group courses—Courses numbered 701 and 721 explore topics not normally included in departmental offerings and utilize insights and methods from disciplines in addition to those usually identified with the sponsoring department. The 701 number is used to designate courses taught by an individual faculty member; the 721 number is used to designate upper-level courses in which faculty from two or more departments investigate a topic of mutual academic interest.

KEY TO ABBREVIATIONS

The following abbreviations are used by the University for course designations.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BiSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
CH&D	Child Health and Development
Chin	Chinese
CE	Civil Engineering
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EngS	Engineering Science
Engl	English
EFL	English as a Foreign Language
EnHe	Environmental Health
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Ger	Germanic Languages and Literatures
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
IAf	International Affairs
Ital	Italian
Japn	Japanese
Jour	Journalism
Law	Law
LEnf	Law Enforcement
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
M&PA	Medical and Public Affairs
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecology
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Oral	Oral Biology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology

Rel	Religion
SLP	Service Learning Program
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SpDr	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Op tions
U&RP	Urban and Regional Pla ning
Urol	Urology
WStu	Women's Studies

SEMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory com tion of a course is, in most cases, indicated in parentheses after the t of the course. Thus, a year course giving three semester hours of cr each semester is marked (3–3), and a semester course giving three semes hours of credit is marked (3). A semester hour may be defined as one minute period of class work or one laboratory period a week for semester.

TIME OF COURSE OFFERINGS

Following most course descriptions is a parenthetical statement listing t semester (fall or spring) for which the course is scheduled. The te "academic year" is used only with two-semester courses, and indicates th the first half of the course is to be offered in the fall semester and t second half in the spring semester. Not all offerings for the summer s sions are listed in this *Bulletin*. Students should consult the *Summer S sions Schedule of Classes* for additional summer offerings. A *Schedul Classes* is published each fall and spring semester to provide informa concerning the time of course offerings.

ACCOUNTING

Professors E.J.B. Lewis, A.J. Mastro *(Chairman)*, F.C. Kurtz
Professorial Lecturer J. Hilmy
Associate Professors C. Paik, M.G. Gallagher
Associate Professorial Lecturer F.W. Segel
Assistant Professors G. Bodnar, P. Welling
Assistant Professorial Lecturer E.J. Shuchart
Adjunct Instructors G.E. Farrelly, D.R. Sheldon

Bachelor of Business Administration in the field of accounting—See pages 137–44.

Master of Business Administration with a field of concentration in accounting—Prerequisite: a bachelor's degree, see pages 146–52.

Required: the general requirements, pages 148–52. The recognized Common Body of Knowledge in business administration is required of all candidates; this knowledge may be obtained as part of an undergraduate degree in business or as part of the total M.B.A. degree program at this University. The Common

Body of Knowledge may be satisfied by the following courses at this University, or the equivalent: Acct 201, 211; BAd 230, 240; Econ 217, 218; Mgt 202, 218. In addition to this requirement the student's program of study will consist of (1) the required courses in administration (Mgt 201, 204, 207); (2) the accounting concentration (Acct 262, 275,* 276, 282,* 296; BAd 231); (3) a research course (Acct 295 for students not electing a thesis and Acct 300 for students electing a thesis); and (4) six semester hours of electives, selected with the approval of the advisor, from two related fields.

For programs of study in accounting leading to degrees of *Doctor of Business Administration* and *Doctor of Public Administration*, see pages 160–63.

Accounting courses numbered below the 200 level may not be taken for graduate credit. Accounting courses numbered 201 and above may not be taken for undergraduate credit.

First Group

1–2 Introductory Accounting (3–3) — **Gallagher, Kurtz**

Basic understanding of accounting concepts, procedures, analyses and reports; the accounting measurement and communications of significant economic and financial data. There is a $25 laboratory fee for Acct 1. Prerequisite to Acct 2: Acct 1. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 1. (Acct 1 and 2—fall and spring)

Second Group

101 Cost and Budgetary Control (3) — **Bodnar**

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 220 cannot receive credit for Acct 101. (Fall and spring)

111 Financial Statement Analysis (3) — **Hilmy**

Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2. (Spring)

115 Financial Accounting (3) — **Gallagher, Segel**

Role of accounting in decision-making of external parties; understanding, interpretation and implementation of financial accounting. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 115. (Fall and spring)

121 Intermediate Accounting (3) — **Mastro**

In-depth study of accounting functions and basic theory; acquisition of assets and services, income and equity accounting, preparation and analysis of financial statements. Prerequisite: Acct 1–2. Laboratory fee, $25. (Fall)

132 Accounting Theory (3) — **Mastro**

Current thought as reflected in the pronouncements of leading professional and accounting research associations, major contributions to accounting literature. Prerequisite: Acct 121. (Spring)

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*Acct 220 must be taken in place of Acct 275 or 282 if a course in cost and budgetary accounting was not taken prior to entering the M.B.A. program.

141 **Governmental Accounting** (3)

Appropriation, encumbrance, and fund accounting for governm and institutional entities. Prerequisite: Acct 1–2. (Fall)

161 **Federal Income Taxation** (3)

Gallag

Federal income tax concepts applicable to individuals and corp tions, differences between tax accounting and financial account (Fall and spring)

171 **Auditing** (3)

Principles and procedures of auditing: generally accepted audi standards, internal control, audit objectives and reports, form-pr ration-use of audit work papers, audit evidence. Prerequisite: A 121. (Fall)

181 **Accounting Systems** (3)

Bod

Organization and use of accounting information: origination, cla fication, control, and reporting; development, design, and installa of accounting systems; accounting communication patterns. P requisite: Acct 101, 171. (Spring)

191 **Advanced Accounting** (3)

Gallag

Application of accounting theory to special areas: consolidated st ments, business combinations, earnings per share, foreign excha price-level adjusted statements, source and application of fu Prerequisite: Acct 121. (Spring)

193 **Business Budgeting** (3)

Lewis, P

Principles and procedures in the development, installation, and op tion of a system of budgetary control to aid management. Prere site: Acct 1-2. Students who have received credit for Acct 101 can receive credit for Acct 193. (Fall and spring)

199 **Accounting Practice Internship** (3)

Mast

Concepts, procedures and standards of auditing practice obtain an intern with a firm or agency. Prerequisite: 15 semester hours of accounting courses (including a course in auditing), senior status, and approval of the chairman of the department.

Third Group

201 **Financial Accounting** (3)

Wellin

For designated students in the M.B.A. program. The role of account ing in the decision-making process of external parties; the understand ing, interpretation, and implementation of financial accounting. Stu dents who have received credit for a similar financial accounting course cannot receive credit for Acct 201. (Fall and spring)

211 **Business Law For Accountants** (3)

Gallagher

For designated students in the M.B.A. program. A survey of the legal process and a study of the principles and precepts of business law: contracts, property, sales, negotiable instruments, partnerships, and corporations. (Fall)

220 **Management Accounting** (3)

Bodnar

The role of accounting in the decision-making processes of manage ment; understanding of how accounting influences resource allocation

decisions in the organization. Prerequisite: Acct 201 or a similar financial accounting course. Students who have received credit for a similar management accounting course cannot receive credit for Acct 220. (Fall and spring)

262 **Business Income Taxation** (3) Gallagher
Federal income tax concepts applicable to corporations, partnerships, and their owners; emphasis on tax planning factors in business decisions and tax research. (Fall)

275 **Contemporary Auditing Theory and Procedures** (3) Kurtz
Study of auditing concepts: generally accepted auditing standards, application of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 201 and 220, or equivalent. (Spring)

276 **Management Planning and Control** (3) Paik
Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational subunits, transfer pricing, contemporary control systems, accounting framework and cycle. Prerequisite: Acct 201 and 220, or equivalent. (Spring)

282 **Accounting Information Systems** (3) Bodnar
Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 201 and 220, or equivalent. (Fall)

290 **Special Topics in Accounting** (3) Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

295 **Research Methods** (3) Paik
(Fall and spring)

296 **Seminar in Accounting** (3) Mastro
Selected accounting studies; critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 201 and 220, or equivalent. (Spring)

298 **Directed Readings and Research in Accounting** (3) Mastro and Staff

299 **Thesis Seminar** (3) Mastro and Staff
(Fall and spring)

300 **Thesis Research** (3) Mastro and Staff
(Fall and spring)

ourth Group

ourth group courses are limited to doctoral students. They are offered as the emand requires.

311–12 **Seminar: Public-Private Sector Institutions and Relationships** (3–3)

398 **Advanced Reading and Research** (arr.) Mastro and
Limited to students preparing for the Doctor of Business Admini
tion or Doctor of Public Administration general examination. Ma
repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Mastro and S
Limited to Doctor of Business Administration or Doctor of Pu
Administration candidates. May be repeated for credit. (Fall
spring)

AMERICAN LITERATURE

See **English.**

AMERICAN STUDIES PROGRAM

Professors R.H. Walker, Jr., C.C. Mondale
Adjunct Professor F. Gutheim
Professorial Lecturer L. Miller
Associate Professors B.M. Mergen, J.O. Horton, H.F. Gillette, Jr. *(Director,*
Adjunct Associate Professor C.R. Field
Associate Professorial Lecturers J. Mahoney, Jr., D.A. O'Toole, T.A. Co
Adjunct Assistant Professor P.M. Palmer
Assistant Professorial Lecturers B.G. Carson, L.D. Lankton, H.W. Marsha

Affiliated Programs

John Y. Cole (Library of Congress)
Atlee Schidler (Washington Center for Metropolitan Studies)
Wilcomb E. Washburn (Smithsonian Institution)

Faculty Advisory Committee

H.F. Gillette *(Chairman)*, R.N. Ganz, F.S. Grubar, R.L. Humphrey, H.L. LeBlanc, C.H. Pfuntner, R.P. Sharkey, R.W. Stephens, A.M. Yezer, D. Wa. lace, Jr.

American Studies Council

The Council serves the American Studies Program in an advisory capacity. It includes representatives from the student body, the Washington com. munity, the faculty, alumni, and affiliated programs.

Bachelor of Arts with a major in American Civilization (Field-of-Study)—The following requirements must be fulfilled.

1. The general requirements stated on pages 74–75, 80–87.
2. Prerequisite course—AmCv 71-72. (In preparation for the major field it is recommended that students take the introductory American history course and elect introductory courses in anthropology, art, economics, English, geography and regional science, philosophy, political science, religion, and sociology.)

3. Required courses in the major—(a) 15 semester hours of approved second-group courses in the humanities (history may be elected for [a] or [b], but not for both); (b) 15 semester hours of approved second-group courses in social studies; (c) AmCv 179-80, which must be taken in the senior year.

4. In addition to the meaningful initiation requirement (see pages 74–75), students must elect three or four additional semester hours in the natural and mathematical sciences or in geography and regional science.

The major examination required of all seniors must be satisfactorily completed in the final year.

Special Honors will be awarded to students who fulfill the general requirements (see page 51) and in addition (1) receive grades of *A* in at least half of their courses in the two areas of concentration and (2) receive honors in the major examination.

Two years of a foreign language or adequate preparation in statistics, logic, or linguistics is strongly recommended. Students should consult frequently with an American Civilization advisor.

Master of Arts in the field of American Civilization—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in American Civilization or in the subject in which concentration is contemplated.

Required: the general requirements, pages 90–98, including (1) AmCv 271–72 (six semester hours), a seminar on scope and method in American Civilization; (2) 18 additional semester hours in a carefully related pattern, focusing on a concentrated approach to the study of American Civilization; (3) a master's thesis (six semester hours) written on an approved topic under the direction of the instructor in whose field the major emphasis falls; (4) a Master's Comprehensive Examination reflecting the candidate's area of concentration. Special options in the degree program include the following:

1. *A concentration in Museum Training*—Course emphasis on substantive research in material culture under direction of staff at the Smithsonian Institution. Required: in addition to the general requirements outlined above, AmCv 250. Recommended, but not required: AmCv 252, 351 or 352 (advanced research), AmCv 251 (internship) and other related courses offered by the departments of anthropology, art, or education.

2. *A concentration in Historic Preservation*—Course emphasis on interpreting issues in historic preservation through a humanistic framework. Prerequisite: background in urban history. Required: in addition to the general requirements outlined above, AmCv 277–78. Recommended, but not required: additional courses in architectural history, urban and regional planning, and local history.

Master of Arts in the field of Museum Studies, see pages 383–84.

Doctor of Philosophy in the field of American Civilization—This program combines work in the humanities and/or social sciences as preparation for research and teaching, with the option of stressing preparation for museum and library careers. Applicants are required to have an adequate background in the humanities and/or social sciences as they apply to the understanding of American civilization.

Required: the general requirements, pages 90–92, 98–100. Candidates must pass a General Examination in four areas. American cultural history is the only required field. Three other fields may be elected with approval of the advisory committee; one field must represent foreign coverage. Other areas may be chosen from the following groups: (1) American diplomatic, economic, political, social, or urban history; American literature, art, philosophy, or religion; Afro-American history; historic preservation; or some areas of the social and behavioral sciences; (2) in affiliation with the Library of Congress—supervised historical study in bibliographic resources including American history and politics, cartography, cross-cultural studies, government documents, graphic arts and music,

motion pictures and recorded sound, printing and bookmaking; (3) in affili
with the Smithsonian Institution (Museum of History and Technology, Nat
Portrait Gallery and National Collection of Fine Arts)—supervised studie
cluding architectural history, decorative arts, ethno-history, historical arch
ogy, history of science, history of technology, industrial archeology, mat
aspects of American civilization, and various fields in the history of art.
ditional areas of study may be arranged within the University and in both
Library of Congress and Smithsonian cooperative programs. Special annou
ments concerning these programs are issued periodically and are availabl
the Office of the Director of the American Studies Program.

Research fields for the dissertation may be chosen from any of the ab
except those dealing with the culture of an area outside the United States.

First Group

71–72 **Introduction to American Civilization** (3-3) Wa
Themes and issues in American civilization since Colonial times. w
emphasis on their contemporary importance. (Academic year)

Second Group

160-61-62 **Studies in American Literature** (3–3–3) Seavey, Combs, Schne
Same as Engl 160–61–62. Major factors in the national cultural tra
tion as shown by outstanding writers. (Academic year)

177 **Introduction to Historic Preservation** (3) St
Washington, D.C. will be the primary exhibit for the study of histor
preservation as it has developed over the past century. Experienc
with preservation issues as shown by examples in other localitie
will also be discussed. Lectures, class discussions of the readin
and field trips to neighborhoods and sites subjected to preservat
efforts. (Summer)

179–80 **Proseminar in American Civilization** (3–3) Mer
Coordinating course for seniors majoring in American Civiliza
(Academic year)

*185 **History of Women in America** (3) Staf
Survey of the political, economic, social, military, religious, intellec
tual, and cultural practices in North America from 1000 A.D. to the
present as these have affected and been affected by the female half of
the population. (Spring)

*186 **U.S. Urban History** (3) Gillette
History of the American city from colonial foundations to the present,
focusing on relationships between social and economic forces with
physical form. Special emphasis on transitions from pre-industrial
industrial to metropolitan forms, with attention to implications for
public policy and historic preservation. (Fall)

†192 **The American Cinema** (3) Mergen
History and criticism of American films. The course will enable the
student to recognize and evaluate cinema techniques, to express the
evaluation clearly in writing, and to understand the role of films in
the context of American culture. (Spring)

* Joint offering of the American Studies Program and the History Department.
† Joint offering of the American Studies Program and the Speech and Drama Department.

195 **Independent Study** (3) Staff

Open to a limited number of American Civilization majors as directed research or as an internship with a Washington museum or historical society. Approval of advisor required. (Fall and spring)

*197 **Oral History and Interview Techniques** (3) Staff
(Formerly 4 credits)

Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area. (Spring)

Third Group

225 **History of Washington, D.C.** (3) Gillette

The social history of Washington, from village to metropolis, with emphasis through field trips on the evolution of residential neighborhoods and related issues of historic preservation and conservation. Same as Hist 225. (Summer)

†254 **Seminar: Folklore in America** (3) Staff

Various aspects of American traditional culture, including the theory and methodology of folklore research.

‡260 **Women in the American Work Force** (3) Palmer

Multidisciplinary historical survey of women's work roles and labor force participation, including social prescriptions for and self-perceptions of women, market and technological factors affecting women's work choices, psychological responses to work roles, and familial organization of work duties. Differential attitudes and experiences by class, race, and ethnic groups. (Fall)

271–72 **Seminar: Scope and Methods in American Studies** (3–3) Mergen

Consideration of American studies as an area for research and teaching; introduction to bibliography. Required of candidates for the degree of Master of Arts in the field of American Civilization. (Academic year)

*273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) Horton

Prerequisite: Hist 173–74 or equivalent.

276 **U. S. Architectural History** (3) Field

Basic stylistic developments in American architecture from the 17th through the 20th centuries, with special emphasis on the applicability of style recognition to buildings and neighborhoods in urban America. Architecture as evidence of American cultural history and guide to historic preservation. (Fall)

§277–78 **Historic Preservation** (3–3) Staff

The preservation movement and its literature. Review of current experience, preservation practice and techniques. Emerging aspects

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int offering of the American Studies Program and the History Department.
int offering of the American Studies Program and the Anthropology Department.
int offering of the American Studies Program and the Women's Studies Program.
int offering of the American Studies Program and the History and Urban and Regional Plan-
3 Departments.

of historic preservation. Examples of historic, cultural, and hum
values affecting preservation activities. (Academic year)

280 **Seminar: Urban History** (3)
(Spring)

289–90 **Seminar: Topics in American Civilization** (3–3)
Research problems selected by the instructor. Preparation in A
can cultural history or other area appropriate to the topic
seminar. (Academic year)

295 **Independent Study** (arr.)
Limited to master's candidates. Permission of instructor, in wr
required. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Fourth Group

*373–74 **Readings on the Negro in American Culture** (3–3) Hi
For students preparing for the Doctor of Philosophy general exa
tion in the field of the Negro in American culture.

379–80 **Readings in American Cultural History** (3–3) Wa
For students preparing for the Doctor of Philosophy general exa
tion in the field of American Civilization. (Academic year)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy gen
examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated
credit. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE LIBRARY OF CONGRESS

The Graduate School of Arts and Sciences is affiliated with the Library
Congress in a program leading to the degree of Doctor of Philosophy. The fo
lowing courses are offered at the Library of Congress by members of its staff

Third Group

255–56 **Research Orientation Seminar: Americana in the Library of Congress** (3–3) Cole, Walk
Examination of the collections of the Library of Congress with
aim of increasing understanding of American culture and awareness
of library-oriented research problems and possibilities. For students
in the affiliated doctoral program, this course may lead directly to
field in "Research Materials for the Study of American Life: Their
Content, Collection, Arrangement, and Use." (Academic year 1979–
80 and alternate years)

* Joint offering of the American Studies Program and the History Department.

Fourth Group

355–56 **Practicum: Advanced Library Research** (3–3)

Practical problems in control of library materials with emphasis on collections in the Library of Congress. A reading field in the affiliated program. Prerequisite: AmCv 255–56. (Academic year)

389 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy general examination in fields offered in affiliation with the Library of Congress. May be repeated for credit. (Fall and spring)

390 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations based upon or significantly related to collections of the Library of Congress. Supervised by specialists at the Library. Prerequisite: AmCv 355–56. (Fall and spring)

COURSES OFFERED IN AFFILIATION WITH THE SMITHSONIAN INSTITUTION

The Graduate School of Arts and Sciences is affiliated with the Smithsonian Institution's Program for Graduate Students in the History of American Civilization. The following courses are offered at the Museum of History and Technology and at the National Portrait Gallery, by members of their staffs:

Third Group

250 **Orientation Course: Material Aspects of American Civilization** (3) — Washburn, Mergen

Familiarization with the historical collections of the Smithsonian Institution and introduction to opportunities for research and publication based on historical objects. Required of all students in the master's and doctoral programs affiliated with the Smithsonian Institution. (Fall)

251–52 **Museum Research and Education** (3–3) — Washburn and Staff

Supervised work and/or study under the direction of Smithsonian staff members and research associates—museum visitor behavior, costumes and furnishings, decorative arts, and photography as historical documentation. (Fall and spring)

*270 **Seminar: Museum Exhibiting** (3) — Mahoney

Selected museum exhibiting problems in the social and natural sciences, including methods and techniques of exhibition, problems of museum communication and education. (Fall)

†284 **Seminar: Studies in American Art and History** (3) — Miller

Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. May be repeated for credit. (Fall and spring)

*Joint offering of the American Studies Program and the Anthropology Department.
†Joint offering of the American Studies Program and the Art Department.

286 **Readings in the History of Technology in America** (3)

Seminar focusing on the major outlines of technological innov in the United States. Beginning with Colonial and early Federal p technology transfer and adaptation, the course emphasizes the r sectors of 19th- and early 20th-century industrial and engine development. (Fall)

287 **Introduction to Industrial Archeology and Material Culture** (3)

Intensive study of tools, machines, and industrial architecture, fo ing on the kinds of data they supply the historian. Students w assigned objects to research. (Spring)

*294 **Field Research in Historical Archeology** (3)

Field techniques, including excavation, recording, photogra preservation, laboratory analysis and interpretation, supplem by seminars on the history, ethnography, and ethnohistory of century St. Mary's City, Md. (Summer)

Fourth Group

351–52 **Research in Selected Aspects of American Civilization** (3–3)

Supervised study and/or field work in selected subject areas rel to the activities of the Smithsonian Institution. (Fall or sprin

394 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Philosophy gene examination in fields offered in affiliation with the Smithsonian stitution. May be repeated for credit. (Fall and spring)

395 **Dissertation Research** (arr.)

For Doctor of Philosophy candidates preparing dissertations sig cantly related to the material aspects of American civilization dents work under curatorial supervision at the Smithsonian I tion. Prerequisite: AmCv 351–52. May be repeated for credit. and spring)

ANATOMY—DOCTORAL PROGRAM

Professors F.D. Allan, T.N. Johnson, R.S. Snell *(Chairman)*, E.N. Albert
Associate Professor M.J. Koering, K.E. Johnson
Assistant Professor **J. Kerns**

Doctor of Philosophy in the field of Anatomy—**Required: The general r** quirements, pages 90–92, 98–100. Candidates must also fulfill tool requirem by demonstrating proficiency in two of the following: a language (Germa French, or Russian), biostatistics, computer science, or biological instrumen tion. There will also be a comprehensive written and oral examination that w cover at least three areas of anatomical studies.

Research fields: cell ultrastructure, embryology, gross anatomy, histology human genetics, neuroanatomy, and physical anthropology.

* Joint offering of the American Studies Program and the Anthropology Department in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) Commission.

Third Group

202 **Gross Anatomy** (6) — **Snell and Staff**
Regional dissections of adult cadaver supplemented with lectures and x-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) — Allan
Origin and development of human body; emphasis on value of embryology in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) — T. Johnson
Gross and microscopic anatomy of central nervous system and special senses. Laboratory fee, $13. (Fall)

205 **Human Microscopic Anatomy** (3) — Albert and Staff
Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $20. (Fall)

206 **Scanning Electron Microscopy** (2) — Koering
(Formerly 3 credits.)
Preparative techniques for various biological tissues, operation of scanning electron microscope, and interpretation of micrographs. Laboratory fee, $30. Enrollment limited. Prerequisite or concurrent registration: Anat 260. (Fall)

208 **Comparative Vertebrate Neurology** (1) — T. Johnson
Survey of the evolution of the vertebrate brain. Prerequisite: Anat 204. Laboratory fee, $10. (Spring)

209 **The Use of Audiovisual Techniques in Anatomy** (2) — Allan
Preparation of a significant audiovisual program about some aspect of human anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2) — Snell
Applying computer techniques to the problems of learning anatomy. Limited enrollment. Laboratory fee, $20. (Spring)

212 **Neurobiology (3)** (Same as Phyl 212) — Staff
An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

221–22 **Seminar** (1–1) — **Gilson***
Research reports and discussions of special topics by guest lecturers, staff, and students. (Academic year)

249 **Introduction to Anatomical Research** (1) — Staff
Major research techniques as applied to biological materials in the various anatomical disciplines. (Fall)

252 **Physical Anthropology** (1) — Angel
Variations in humans and factors affecting them; human evolution and racial differences; anatomy and culture of ancient humans. (Spring)

* Barbara Ellen Gilson is Assistant Professor of Anatomy in the University's School of Medicine and Health Sciences.

254 **Fetal Anatomy** (2)
Dissection of midgestational fetus. Comparison of fetal and
structures. 20 students. Laboratory fee, $10. (Spring)

256 **Human Genetics** (1)
General principles of genetics, new cytogenetic techniques,
ploidy in humans and its significance, biochemical aspects of here
genetic counseling. (Spring)

260 **Electron Microscopy in Cellular Biology—Lecture** (1)
Introduction to the morphology of the cell and its relationshi
electron microscopic techniques. (Spring)

261 **Transmission Electron Microscopy** (3)
(Formerly Electron Microscopy in Cellular Biology—Laboratory
Introduction to the routine processing of specimens; preparation
interpretation of micrographs. Limited enrollment. Admission by
mission of instructor. Prerequisite or concurrent registration:
260. Laboratory fee, $25. (Fall and spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2)
Snell and
Detailed dissection, supplemented by x-ray anatomy; discussions
signed reading. Limited enrollment. Laboratory fee, $10. (Spri

264 **Gross Anatomy of Head and Neck** (2)
Detailed dissection, supplemented by x-ray anatomy; discussions
signed reading. Limited enrollment. Laboratory fee, $10. (Spri

266 **Gross Anatomy of Thorax and Abdomen** (2)
Detailed dissection, supplemented by x-ray anatomy; discussions
signed reading. Limited enrollment. Laboratory fee, $10. (Spri

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2)
Snell and
Detailed dissection, supplemented by x-ray anatomy; discussions
signed reading. Limited enrollment. Laboratory fee, $10. (Spring)

270 **Dissection of the Human Brain** (1)
T. Johnson
Dissection of major pathways and nuclei of the brain with considera
tion of ventricular system; conferences and assigned reading. Limited
enrollment. Laboratory fee, $10. (Spring)

272 **Autonomic Nervous System** (1)
Allan
Development, microscopic and gross anatomy, function of central and
peripheral components of autonomic nervous system. (Spring)

276 **Advanced Studies in Anatomy** (1)
Staff
Lectures and conferences on selected anatomical subspecialties—
endocrinology, teratology, growth, and others. May be repeated for
credit. (Spring)

288 **Surface Anatomy and Radiology** (1)
Snell
Lectures and demonstrations on areas of clinical importance.
(Spring)

295 **Research** (arr.) Staff
Content differs each time course is offered; may be repeated once for credit. Fee to be arranged. (Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ANTHROPOLOGY

Professors R.K. Lewis, R.M. Krulfeld, C.M. Turnbull *(Visiting)*
Professorial Lecturer J.L. Angel
Associate Professors R.L. Humphrey, Jr., V.K. Golla *(Chairman)*, S.L. Simons
Associate Professorial Lecturers A.G. Wright, J. Mahoney, Jr., G. Stuart
Assistant Professor A.S. Brooks
Assistant Professorial Lecturers S. Hertz, M. Koch-Weser, B. McMillan, C.R. Rose
Lecturer J. Lanouette

Bachelor of Arts with a major in anthropology *(departmental)*—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite course—Anth 1–2.
3. Required courses in other areas—(a) 12 semester hours, or equivalent, of ntroductory French, German, Russian, or Spanish (or another major language pproved by the Anthropology Department); (b) six to twelve semester hours f course work in related departments. Recommended for ethnological emphasis re courses in economics, political science, psychology, and sociology; for rcheological emphasis, courses in American civilization, art history, geogaphy and regional science, geology; and history; for emphasis in physical nthropology, courses in anatomy and biological sciences. Statistics is strongly ecommended for all anthropology majors.
4. Requirements for the major—24 to 36 semester hours in second-group nthropology courses, including Anth 192 and courses in each of the following ategories: aspects of culture (courses numbered in the 150s), linguistics ourses numbered in the 160s), ethnology (courses numbered in the 170s), and hysical anthropology or archeology (courses numbered in the 180s). Qualified niors may enroll in 200-level courses with permission of the instructor. Up six semester hours of ethnographic or archeological field school credit may e accepted and applied toward the major with the approval of the department, d majors are encouraged to participate in such summer programs offered here elsewhere. Opportunities for field and laboratory research are also perilically available to exceptionally able students both with staff members nducting research and at one of the several excellent anthropological museum cilities in the area. Credit for such work may be granted through registration r Anth 195.

Bachelor of Arts with a major in classical archeology and anthropology (interdepartmental)—An interdepartmental major offered by the Anthropology and Classical Departments. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult a departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the natural and mathematical sciences.)
2. Prerequisite course—Anth 1–2.
3. Required courses in the major—Anth 152, 156, 177, 183; Art 101, 102, 111; Hist 109, 110. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of anthropology—Prerequisite: a Bachelor of Arts degree with a major in anthropology from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. The minimum requirement consists of 24 semester hours of anthropology courses plus a thesis (equivalent to six semester hours). A thesis is preferred; however, under certain circumstances, with the approval of the department, students may elect a program of study consisting of 36 semester hours of anthropology courses without a thesis. There are no specific required courses; however, the student's program must cover the major areas of anthropological interest which have been approved in advance by the department's graduate adviser. A reading knowledge examination in one foreign language must be passed before beginning the third semester of graduate work. A tool course in statistics, chemistry, computer programming, or a similar technical discipline may be substituted for the foreign language reading examination with the approval of the department. Students who are writing a thesis must take the Master's Comprehensive Examination before registration for the second half of thesis work.

Master of Arts in anthropology with a concentration in museum training—The program is designed to provide an overall knowledge of the theoretical and practical aspects of museum operations along with a background in the various subdisciplines of anthropology. Prerequisite: a Bachelor of Arts degree with a major in anthropology from this University or an equivalent degree.

Required: the general requirements, pages 90–98. The program of study consists of 36 to 42 hours of course work which should include 12 to 15 hours of museum-related courses or internships (Anth 290 or 295). A limited number of internships are available at the Smithsonian Institution and other area museums. A reading knowledge examination in a major foreign language must be passed before the beginning of the third semester. With departmental approval, statistics or chemistry may also satisfy the tool requirement. Although the program does not require a thesis, students will be expected to produce at least one research paper of publishable quality during the course of study. Students must also successfully pass the written Master's Comprehensive Examination in anthropology.

Master of Arts in the field of Museum Studies—See pages 383–84.

Departmental prerequisite: Anth 1 is prerequisite to Anth 182–89 and 192–95. Anth 2 is prerequisite to Anth 150–79 and 192–95. These prerequisites may be waived by permission of instructor.

First Group

1–2 **Introductory Anthropology** (3–3) *Staff*

Anth 1: survey of human origins, physical evolution, and culture

history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior. (Anth 1 and 2—fall and spring)

Second Group

*115 **Field Methods in Comparative Cultural Ecology: Mesoamerican Archeology** (6) Humphrey, Mergen
Field study in Mexico. Intensive analysis of Mesoamerican culture history. (Summer)

150 **Comparative Value Systems** (3) Krulfeld
World views, conceptual systems, and value orientations of representative cultures throughout the world.

151 **Primitive Economics** (3) Krulfeld
Comparative study of various economic organizations, including hunters and gatherers, herders, and cultivators. (Spring, odd years)

152 **Man, Culture, and Environment** (3) Humphrey
Basic principles of cultural ecology. Human interaction with the ecosystem both past and present; emphasis on the application of anthropological precepts to current environmental problems.

153 **Psychological Anthropology** (3) Staff
Relevance of psychological theories to human evolution and the cross-cultural study of personality. Cultural determinants of personality formation and mental health. (Fall)

154 **Mythology and Folklore** (3) Staff
Traditional verbal expression of supernatural or social beliefs: metaphorical thought; verbal art. (Fall)

155 **Primitive Religion** (3) Simons, Golla
Conceptions of the supernatural in nonliterate societies. Religious beliefs and practices. Emphasis on religious process and change. (Spring)

156 **Comparative Political and Legal Systems** (3) Simons
Cross-cultural study of ancient and modern systems of social control; moral, ethical, and legal factors which operate to produce behavioral norms. (Spring)

157 **Primitive Social Organization** (3) Simons, Hertz
Analysis of the social organization of primitive peoples; kinship, economic, and political systems. (Fall)

158 **Art and Culture** (3) Krulfeld, Humphrey
The art of tribal society, including the role of art in culture, influences upon the artist, and beliefs and practices associated with art production.

159 **Cognitive Anthropology** (3) Golla
(Formerly Ethnography of Knowledge)
The organization of empirical knowledge in literate and nonliterate

oint offering of the American Studies Program and the Departments of Anthropology and ography and Regional Science.

societies. Processes of hypothesis, deduction, and classificati
(Fall, odd years)

161 **Language and Culture** (3) Go
Structure and semantics of systems of human communication:
guistic change; social aspects of language. (Fall)

162 **Linguistics in Anthropology** (3) Go
Introduction to general (descriptive and comparative) linguis
(Spring)

170 **Cultures of the Caribbean** (3) Lew
Culture history and ways of life among the area's various cultu
groups up to the ethnographic present. (Spring, even years)

171 **Native Peoples of North America** (3) Simons, Humphr
Comparative study of Indian groups representative of each of
continent's culture areas. (Fall)

172 **Cultures of South America** (3) Koch-We
(Formerly Native Peoples of South America)
Survey of Indian groups representative of each of the continen
culture areas. Hacienda, plantation, and urban adaptations of India
and African groups. (Fall)

173 **Cultures of the Pacific** (3) Lewi
Culture history and ways of life among native peoples of Melanesia
Micronesia, and Polynesia. (Fall, even years)

174 **Far Eastern Communities** (3) Krulfeld
Social organizations, religions, economies, and problems of current
anthropological interest of Far Eastern cultures, including Japan
Korea, China, and India. (Fall, even years)

175 **Cultures of Southeast Asia** (3) Krulfeld
Representative Southeast Asian cultures from nonliterate societies
to high civilizations. (Fall, odd years)

176 **Cultures of the Circumpolar Region** (3) Humphrey
Survey of the social and economic adaptations to an extreme climate
made by peoples of the northern subarctic and arctic regions of
North America and Eurasia. (Spring)

177 **Cultures of the Near East** (3) Lewis
Geographic environment, language, religion, and social structure of
settled and nomadic peoples of the Near East; emphasis on the Arab
world. (Spring, odd years)

178 **Cultures of South and East Africa** (3) Lewis
Comparative examination of the history, cultural development, and
contemporary problems of southern and eastern African cultures.
(Fall, odd years)

179 **Cultures of West and Central Africa** (3) Lewis
Comparative examination of the history, cultural development, and
contemporary problems of western and central African cultures.
(Spring, even years)

182 **New World Archeology** (3) Humphrey
Introduction to archeological methodology, theory, and survey of North American culture history from human entry into the Americas during the Pleistocene period until the time of the first European contacts. (Spring)

183 **Old World Prehistory** (3) Brooks
Specific area and periods to be announced in the *Schedule of Classes*. Survey of human prehistory in Europe, Africa, and Asia from the earliest hominid cultures to the beginnings of advanced civilizations and their secondary centers. May be repeated for credit with permission of instructor. (Fall)

184 **Ethnohistory** (3) Stuart
Cultural reconstruction of behavioral and ideological patterns of past societies. Specific cultural area to be announced in the *Schedule of Classes*. (Spring)

185 **Latin American Archeology** (3) Humphrey, Stuart
Culture history of pre-Columbian Latin America from the Paleo-Indian period through the Spanish Conquest, emphasizing the origin and development of Latin American high civilizations. (Spring, odd years)

186 **Physical Anthropology of Modern Man** (3) Angel
Individual and social biology, methods, and techniques. Genetic, cultural, and ecologic backgrounds of individual and population variation: micro-evolution, growth, paleodemography, paleopathology, forensic identification, techniques. (Spring)

187 **Introduction to Hominid Evolution** (3) Brooks
The fossil record of hominid evolution considered in the light of evolutionary theory. Brief review of the earlier human antecedents, with concentration on the Pleistocene remains. (Spring, odd years)

188 **Primatology** (3) Brooks
Physical and behavioral characteristics of the various primate groups and their relationship to human physical and cultural evolution. Frequent meetings at the National Zoological Park. (Fall, odd years)

189 **Human Sexuality** (3) Staff
Evolutionary basis of sex-role behavior and cross-cultural solutions to human sexuality problems. (Summer)

192 **Anthropological Theory** (3) Krulfeld, Brooks
Theoretical postulates and assumptions underlying the development of modern cultural anthropology. (Fall)

193 **Anthropological Methods** (3) Krulfeld, Lewis
Approaches to library and field research. Conceptual bases and biases in the delineation of problems; in the selection, analysis, and organization of data; and in the preparation of the final report. Strongly recommended, though not required, for all graduate students. (Spring)

195 **Undergraduate Research** (arr.) Staff
Individual research problems to be arranged with a member of the faculty. May be repeated for credit. (Fall or spring)

Third Group

202 Seminar: Recent Trends in Anthropology (3) Kruli
Major topics of interest in contemporary anthropology since the
20th century will be taken up in order, stressing current journal
monograph materials (Spring, odd years)

***211 Seminar: Problems in Conservation** (3)
Individual conservation projects to determine composition, constr
tion, decomposition of materials, and possible stabilization te
niques. Conservation laboratory experience. Prerequisite or conc
rent registration: Art or Anth 212. (Fall)

***212 Advanced Conservation Techniques** (3)
Physical stucture, molecular biology, and chemistry of ethnograp
materials. Chemistry and physics underlying techniques used to c
serve these materials. Prerequisites: Art or Anth 293, Chem 50 a
permission of instructor. (Fall)

†215 Field Methods in Comparative Cultural Ecology: Mesoamerican Archeology (6) Humphrey, Mer
Field study in Mexico. Directed individual research in the history
Mesoamerican culture. (Summer)

‡254 Seminar: Folklore in America (3) Mer
Various aspects of American traditional culture, including the theo
and methodology of folklore research.

255 Seminar: Teaching Anthropology through Washington's Resources (3) Sta
Examining current research and innovative classroom techniques
combined with field trips to area museums, laboratories, and scen
Designed for secondary school anthropology teachers. (Summer

261 Seminar: Anthropological Linguistics (3)
Anthropological study of language—dialectology, ethnosemantics,
descriptive and comparative studies of exotic languages. Specific
topic to be announced in the *Schedule of Classes*. (Spring)

262 Seminar: Applied Anthropology (3) Lewis
Use of anthropological methods and techniques in such specific fields
as government, community development, land reform, law, and medi-
cine. (Fall)

263 Seminar: Culture Contact and Change (3) Simon
Change in Western and non-Western cultures; emphasis on genera
processes of change and interaction between simpler and more com-
plex societies. (Fall)

264 Seminar: Museum Techniques (3) Humphrey
Principles of anthropological collection, classification, preservation,
identification, interpretation, and exhibition of specimens; research

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* Joint offering of the Anthropology and Art Departments.
† Interdepartmental course offered by the American Studies Program and the Departments of
Anthropology and Geography and Regional Science.
‡ Joint offering of the Anthropology Depatment and the American Studies Program.

and instructional use of the museum. Field trips to area museums. (Fall)

265 **Seminar: Method and Theory in Archeology** (3) — Humphrey, Brooks

Analysis of field techniques, dating methods, and theoretical approaches to reconstructing and interpreting the cultures of the past, utilizing the most recent archeological techniques. (Spring)

266 **Seminar: Technology** (3) — Humphrey, Lewis

Cross-cultural examination of the form, function, meaning, and use of material culture and the behavior patterns involved in its production. (Spring, odd years)

267 **Seminar: Economic Anthropology** (3) — Krulfeld

Comparative study of systems of production, distribution, and consumption. (Fall)

268 **Seminar: Peasant Society** (3) — Krulfeld

Cross-cultural analysis of peasant societies, including their manner of functioning within their larger social, economic, and cultural context. (Fall)

269 **Seminar: Structural Problems** (3) — Simons

Comparative survey of principles of descent, kinship terminology, and formation of descent groups; problems of variation and change in kinship systems and development of kinship models. (Spring)

*270 **Seminar: Museum Exhibiting** (3) — Mahoney

Selected museum exhibiting problems in the social and natural sciences, including methods and techniques of exhibition, problems of museum communication and education. Taught at the Smithsonian Institution. (Fall)

272 **Seminar: Topics in Latin American Anthropology** (3) — Koch-Weser

Research topic selected from among peasant movements, ethnic groups, land reform, urbanization, archeological problems. (Spring)

273 **Seminar: Urban Anthropology** (3) — Hertz

Anthropological investigations of city life from Neolithic beginning to the present. Study of occupational, class, and ethnic communities within cities as well as ethnographies of entire cities. Adaptation of traditional field methods to urban settings. (Spring)

274 **Seminar: Topics in American Culture** (3) — Hertz

(Formerly Seminar: Afro-American Culture)

Specific topic or topics to be announced in the *Schedule of Classes*. (Fall)

282 **Seminar: Advanced Archeology—New World Prehistory** (3) — Humphrey, Stuart

Current archeological problems relating to the origin and development of aboriginal cultures. Specific topic to be announced in the *Schedule of Classes*. May be repeated for credit.

*Joint offering of the Anthropology Department and the American Studies Program.

283 Seminar: Topics in Old World Anthropology—Physical Anthropology and Archeology (3) Broo
Current problems in relation to materials from the old world. Spec area to be announced in the *Schedule of Classes.* (Spring, years)

287 Seminar: Problems in Latin American Civilization (3) St
Interdisciplinary seminar partially guided by a specialist within methodology of his or her chosen discipline; each student writes report on some aspects of a selected key theme. Admission by p mission of instructor. (Spring)

290 Advanced Museum Research (3) Staff
Supervised individual research and/or field work at the Smithsonian Institution or other area museums, arranged in consultation with museum and the Anthropology Department. Admission by permiss of the department chairman. May be repeated for credit. (Fall spring)

291 Seminar: Museology (3) Wright
Twentieth century development of museums—natural history, scien and history; their history, philosophy, and organization; their importance and administrative problems. (Spring)

***292 Introduction to Conservation** (3) Rowe
Method and theory of conservation, including fine arts, ethnograph archeological and monuments conservation; handling, restoration preservation, storage, and display of museum specimens; basic ma rials of ethnographic objects and the ways they react to their en vironment. The fall class is only open to conservation students and those who will be registered for Anth 293 in the spring. The summer course deals with conservation of archeological materials. (Fall spring, and summer)

***293 Conservation Laboratory Techniques** (3) Rowe
Examination procedures and analytical techniques used in the con servation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabilization of museum specimens. Prerequisite Anth 292, Chem 13 or equivalent. Taught at the Smithsonian Conservation Laboratory. Admission by permission of instructor (Spring)

†294 Field Research in Historical Archeology (3) McMillan
Field techniques, including excavation, recording, photography preservation, laboratory analysis, and interpretation, supplemented by seminars on the history, ethnography, and ethnohistory of 17th century St. Mary's City, Md. (Summer)

295 Research (arr.) Staff
May be repeated for credit. (Fall and spring)

299–300 Thesis Research (3–3) Staff
(Fall and spring)

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* Interdepartmental course offered by the Departments of Anthropology and Art.
† Joint offering of the Anthropology Department and the American Studies Program, in cooperation with St. Mary's College, the Smithsonian Institution, and the St. Mary's (Md.) City Commission.

ART

Professors L.P. Leite *(Emeritus)*, F.S. Grubar, D.H. Teller
Professorial Lecturers Grace Evans, D.A. Brown, L. Miller
Associate Professor L.F. Robinson *(Chairman)*
Adjunct Associate Professor Grose Evans
Associate Professorial Lecturer B.S. Glassman
Assistant Professors H.I. Gates, W.T. Woodward, F. Griffith, J.F. Wright, Jr., J.L. Lake, A.H. Smith, T. Ozdogan, J.C. Anderson, D.M. Hitchcock, C.C. Costigan, B. Von Barghahn, S.B. Molina
Assistant Professorial Lecturers E.L. Battaglia, E.P. Lawson, B.D. Lourie, C.R. Rose, H.H. Hudgins, Jr., A. Seremetis, K. Montgomery, A.D. Ullberg
Lecturers J. Morrell, Jr., L. Smith
Curator, Dimock Gallery L.D. Miller

Bachelor of Arts with a major in art history (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. Students should consult their departmental advisor regarding courses to be taken to satisfy requirements.
2. Prerequisite courses—Art 31–32 or 71–72.
3. Required courses in related areas—Art 137; Fren 1–2, 3–4, or Ger 1–2, 3–4; Phil 162; or equivalent.
4. Required courses in the major—Art 101 or 102, 104 or 105, 106 or 107, 108, 109, 110, 112, 113 or 114, 117 or 118 or 119; nine additional semester hours in second-group art history courses.
5. A maximum of nine semester hours in Fine Arts, including Art 137, is permitted.

Graduation with Special Honors: students should apply to the chairman of the department at the beginning of their senior year. Before admittance to the program, they must pass a reading examination in either French or German. Upon acceptance, candidates will be assigned to one or more faculty advisors under whose direction they will undertake a supervised program of study.

The Art Department has established a program of study in affiliation with private art galleries in the Washington area. This program is open to a limited number of qualified undergraduate students. For details, consult the chairman of the department.

Bachelor of Arts with a major in Fine Arts (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult their departmental advisor regarding courses to be taken to satisfy requirements.
2. Prerequisite courses—Art 21–22, 41–42 (students concentrating in photography substitute Art 23–24 for 41–42).
3. Required courses in related areas—Art 31–32; six additional semester hours in second-group art history courses.
4. Required courses in the major—27 semester hours of first- or second-group Fine Arts courses in seven areas—ceramics, design, drawing, graphics, painting, photography, and sculpture. Students choose one of these areas as a primary area of concentration, in which 12 semester hours are required. The remaining 15 semester hours must be distributed among the other areas. (Transfer students must take at least 12 semester hours of second-group Fine Arts courses in residence at this University.)

Fine Arts seniors may apply for graduation with Special Honors. To be accepted into this program, students must satisfy the general requirements

(see page 51). They should apply in writing to the chairman of the Department at the beginning of their senior year. Upon acceptance, each can date will be assigned one or more faculty advisors under whose direction project in a special area of interest will be undertaken.

Bachelor of Arts with a major in classical archeology and anthropology (de partmental)—An interdepartmental major offered by the Art and Anthropolo Departments. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. Students shou consult their departmental advisor regarding courses to satisfy requirements
2. Prerequisite course—Anth 1–2.
3. Required courses in the major—Anth 152, 158, 177, 183; Art 101, 102, 1 111; Hist 109, 110. (A reading knowledge of French and German is recom mended.)

Bachelor of Arts with a major in classical archeology and classics (depar mental)—An interdepartmental major offered by the Art and Classics Depa ments. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. Studen should consult their departmental advisor regarding courses to be taken satisfy the requirements.
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 9 semester hours of second-group courses in Greek or Latin, including Clas 13 (A reading knowledge of French and German is recommended.)

Master of Arts in the field of art history—Prerequisite: a Bachelor of Arts de gree with a major in art history from this University, or an equivalent degree Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

1. *With a concentration in classical art and archeology, medieval art, Renais sance and Baroque art, contemporary art, and American art*—Required: the general requirements, pages 90–98; 36 hours of course work including six se mester hours of thesis research. As many as possible of the 36 semester hours of course work should be in third-group courses; not more than six hours may be taken in museum-related courses. Students must maintain a quality-point index of at least 3.25. A reading knowledge examination in German or French must be passed before completion of the first nine semester hours of course work. A written general Master's Comprehensive Examination must be passed before students can enroll for the six semester hours of thesis research. A written thesis must be submitted to and approved by the faculty.

2. *With a concentration in museum training*—Required: the general require ments, pages 90–98; 42 semester hours of course work as follows: 12 hours of art history courses, taken before acceptance into the museum program; Art 201–2 and 271–72, and 18 additional hours of art history courses selected in consultation with the advisor, not more than six hours to be taken in museum related courses. Students must maintain a quality-point index of at least 3.25 A reading knowledge examination in German or French must be passed before completion of the first nine semester hours of course work. Students are required to pass the general written Master's Comprehensive Examination in Art History and may also be required to pass a written comprehensive examination in Museology as part of the requirements for the internship.

Acceptance in this program as a degree candidate is provisional, pending satisfactory completion of 12 semester hours of graduate art history courses and the approval of the Graduate Programs Committee (Department of Art).

The Art Department has established a program of study in affiliation with a number of museums and galleries including the Corcoran Gallery of Art, the

Hirshhorn Museum and Sculpture Garden, the Museum of African Art, the National Collection of Fine Arts, the Phillips Collection, the Renwick Gallery, and the Textile Museum.

3. *With a concentration in museum administration*—For details consult the chairman of the department.

Master of Arts in the field of classical archeology, classics, and history (an interdepartmental degree program offered by the Departments of Art, Classics, and History)—Prerequisite: A bachelor's degree with a background in classical archeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–98, and 30 semester hours of course work, including six semester hours of thesis research (as many as possible should be third-group courses) selected in consultation with the appropriate advisor from the Departments of Art, Classics, and History. Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Fine Arts in the field of ceramics, design, graphics, painting, photography, or sculpture—Prerequisite: a Bachelor of Fine Arts or a Bachelor of Arts degree with a major in Fine Arts in the field of ceramics, design, drawing, graphics, painting, photography, or sculpture. A 3.00 undergraduate grade-point average (on a 4.00 scale) and departmental approval of the applicant's portfolio is required. The portfolio should include at least 10 drawings, including figure studies, and four to six paintings, prints, sculptures, ceramics, or photographs. If shipping is difficult, slides may be submitted in place of the works themselves. Students planning to do graduate work in graphics or painting must have completed 12 semester hours of drawing at the undergraduate level before admittance to the master's program.

Required: the general requirements, pages 90–98. As a tool requirement Master of Fine Arts candidates must take Art 137 or three additional hours of course work selected in consultation with the advisor. As many as possible of the remaining 24 hours of course work should be in third-group courses, only 18 hours of which may be in one area; the remaining six hours are to be selected from related areas in consultation with the advisor. A creative thesis consisting of the execution of original works of art in ceramics, design, graphics, painting, photography, or sculpture will be completed under the supervision of a thesis advisor. In addition, the thesis must include a written statement and analysis of artistic purpose, subject to the approval of the thesis advisor and a second faculty reader. A representative portion of the work illustrating the creative thesis may be retained by the University at the discretion of the thesis director in agreement with the second reader. For details, consult the chairman of the department.

Doctor of Philosophy in the field of art history—Required: the general requirements, pages 90–92, 98–100, and a Master of Arts degree in art history. Candidates must also pass written examinations in French and German, a General Examination in art history, an examination in the area of specialization, and examinations in two areas related to the area of specialization. Students plan their own programs in consultation with a departmental committee.

Areas of Specialization: classical art and archeology, Medieval art, Renaissance art, Baroque art, eighteenth-century art, nineteenth-century art, twentieth-century art, and American art.

Bachelor of Arts in Education with a teaching field in art—Prerequisite: the education curriculum, pages 113–14.

Required: the art option and professional courses listed on page 117.

ART HISTORY

First Group

1 Introduction to Art (3) Von Barghahn and S
General principles, theories, and techniques. (Fall, spring, summer)

31–32 Survey of Western Art (3–3) Robinson and S
A foundation for further study in the history of art. Art 31: pre toric to Gothic art. Art 32: proto-Renaissance to contemporary (Art 31 and 32—fall and spring)

71–72 Introduction to the Arts in America (3–3) Grubar and S
Art 71: Colonial beginnings to the Republican Age. Art 72: 19th c tury to the present. (Art 71 and 72—fall and spring)

Second Group

101 Greek and Roman Architecture (3) S
(Fall)

102 Greek and Roman Sculpture (3) S
(Spring)

103 Classical Iconography (3) S
Origin and development of myths in classical art.

104 Renaissance Art in Italy I (3) Grace Eva
Early developments from the 13th to the 15th century. (Fall)

105 Renaissance Art in Italy II (3) Grace E
High Renaissance and Mannerism. (Spring)

106 Renaissance Art in the North I (3) Hitchcock
Northern painting from van Eyck through the Antwerp Mannerists (Fall)

107 Renaissance Art in the North II (3) Hitchcock
Northern painting and graphics from Dürer through Brueghel (Spring)

108 18th Century Art in Europe (3) Hitchcock
(Spring)

109 19th Century Art in Europe (3) Robinson
(Fall and spring)

110 Contemporary Art (3) Robinson
(Fall and spring)

111 Classical Archeology (3) Staff
Archeological monuments of classical civilizations, with intensive study of one or more areas selected from architecture, sculpture, painting, or minor arts.

112 **Art of Egypt and the Ancient Orient** (3) — Staff
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia. (Spring)

113 **Baroque Art in Italy** (3) — Grose Evans
(Spring)

114 **Baroque Art in the North** (3) — Hitchcock
Holland, Flanders, Spain, France, Germany, and England. (Fall)

115 **Christian Iconography** (3) — Anderson
Origins and development of Christian symbols and themes from early Christian to modern times.

116 **Islamic Art** (3)

117 **Medieval Art I** (3) — Anderson
Early Christian and Byzantine. (Fall)

118 **Medieval Art II** (3) — Anderson
Romanesque and Gothic. (Spring)

119 **Pre-Romanesque Art in the North** (3) — Anderson
Merovingian and Carolingian. (Spring)

120 **Art of China and Japan** (3) — Von Barghahn
(Fall)

121 **Spanish Painting from the Catalan Frescoes through El Greco** (3) — Von Barghahn

122 **History of Spanish Painting from Ribera through Goya** (3) — Von Barghahn

129–30 **Principles of Museum Work** (3–3) — Lawson
Introduction to the history and development of museums: problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service. (Academic year)

140 **Gothic Architecture** (3) — Staff

145 **Folk Arts in America** (3) — Grubar
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts.

147 **Pre-Columbian Art** (3) — Staff

148 **19th-Century American Painting** (3) — Grubar, Grose Evans
(Fall)

149 **19th-Century American Sculpture** (3) — Grubar
(Spring)

150 **Landmarks in American Art** (3) — Grubar

155 **Etruscan Art and Archeology** (6) — Staff
Offered off campus through the College of General Studies.

156 **Early Medieval Sculpture** (3) Eva

161 **Monuments of Christian Rome** (3) Anders

162 **The Art of Oriental Rugs** (3) St

165 **African Art** (3) St

167 **French Painting: 15th and 16th Centuries** (3) Von Barghah

169–70 **History of Furniture** (3) St

Art 169: beginning to 1800; Art 170: 1800 to the present. (Academic year)

Third Group

201–2 **Museum Projects** (3–3) St

Open only to candidates for the degree of Master of Arts in the fie of museum training.

203 **Primitive Art** (3) St

(Spring)

207 **Modern Architecture** (3) St

Europe and America. (Fall)

*211 **Seminar: Problems in Conservation** (3) Ros

Individual conservation projects to determine composition, construc tion, decomposition of materials, and possible stabilization tech niques. Conservation laboratory experience. Prerequisite: Art or Anth 212. (Fall)

*212 **Advanced Conservation Techniques** (3) Staff

Physical structure, molecular biology, and chemistry of ethnogra materials. Chemistry and physics underlying the techniques used to conserve these materials. Prerequisite: Art or Anth 293, Chem 50, and permission of the instructor. (Fall)

213 **Museum Administration and Government** (3) Staff

214 **Museum Administration and Trusteeship** (3) Staff

216 **Medieval Painting** (3) Grace Evans

Painting and the decorative arts.

217–18 **Problems in Museum Work** (3–3) Ullberg

†220 **Seminar: Baroque Art of the 17th Century** (3) Hitchcock

A reading knowledge of Italian is desirable for the Italian area and German for the northern area. (Spring)

†221 **Seminar: Renaissance Art** (3) Staff

A reading knowledge of French, German, or Italian is desirable, de pending on the specific area. (Fall and spring)

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* Joint offering of the Art and Anthropology Departments.
† Specific area announced in the *Schedule of Classes*. May be repeated for credit if the specific area covered is different.

242 **Etruscan Art and Archeology** (6) MacDonald
Offered off campus through the College of General Studies.

*243 **Seminar: American Art** (3) Grubar
(Fall and spring)

*244 **Seminar: 19th-Century European Art** (3) Robinson
Reading knowledge of French desirable.

*245 **Seminar: 20th-Century European Art** (3) Staff

*246 **Seminar: Classical Art** (3) Staff

*247 **Seminar: Medieval Art** (3) Anderson

248 **Independent Research in Art History** (3)
(Fall and spring)

261 **Seminar: Problems in Art History** (3) Staff
Recommended for art history majors; open to limited number of qualified undergraduates, with permission of instructor. Theory, criticism, or methodology of art history. May be repeated for credit. Topic to be announced in *Schedule of Classes*. (Fall and spring)

271–72 **Museum Techniques** (3–3) Staff
Open only to candidates for the degree of Master of Arts in the fields of museum training and museum studies. Practical work to be determined by Museum Training Committees at the institutions involved. (Academic year)

†284 **Seminar: Studies in American Art and History** (3) Staff
Exploration of selected problems and themes in American cultural history involving the use of artistic materials in different media; emphasis on methodology and analytic techniques. (Spring)

289–90 **Thesis Research** (3–3) Staff
(Fall and spring)

‡292 **Introduction to Conservation** (3) Rose
Method and theory of conservation, including fine arts, ethnographic, archeological, and monuments conservation; handling, restoration, preservation, storage, and display of museum specimens; basic materials of ethnographic objects and the ways they react to their environment. The fall section is open only to conservation students and to those who plan to register for Art 293 in the spring. (Fall and spring)

‡293 **Conservation Laboratory Techniques** (3) Rose
Discussion (2 hours), laboratory (8 hours). Examination procedures and analytical techniques used in the conservation laboratory, including discussion of chemical composition of solvents, adhesives, coating, and filling materials used in the restoration and stabilization of

*Specific area announced in the *Schedule of Classes*. May be repeated for credit if the specific area covered is different.
†Joint offering of the Art Department and the American Studies Program in affiliation with the National Portrait Gallery of the Smithsonian Institution.
‡Interdepartmental course offered by the Art and Anthropology Departments.

museum specimens. Taught at the Smithsonian Conservation Laboratory. Prerequisite: Anth 292, Chem 13. (Spring)

Fourth Group

Limited to art history doctoral candidates. Offered as the demand requires.

*385–86 **Readings in Art History** (3–3)

*398 **Advanced Reading and Research** (arr.)
For students preparing for the doctoral examination.

*399 **Dissertation Research** (arr.)

FINE ARTS

Departmental prerequisite: Art 21–22 and 41–42 (students concentrating in photography substitute Art 23–24 for 41–42).

First Group

†21–22 **Design I: Basic** (3–3) Costigan, Teller
Fundamental studies of principles and elements of design. Art 21: study of two-dimensional design. Art 22: three-dimensional studies. Art 21: Laboratory fee, $15. Art 22: Laboratory fee, $21. (Art 21 and 22—fall and spring)

23–24 **Fundamentals of Photography** (3–3) Lake
Fundamental techniques of photography; emphasis on creative expression. Laboratory fee, $36 per semester. (Art 23 and 24—fall and spring)

41–42 **Drawing I** (3–3) Wright
Concepts of drawing, traditional and contemporary; training in perception, analysis of form, use of media, and exercises in connoisseurship. Material and model fee, $15 per semester. (Art 41 and 42—fall and spring)

51–52 **Ceramics I** (3–3) Ozdogan
Working with clay as an art form. Basic techniques of handbuilding, kiln-firing, clay and glaze making. Laboratory fee, $54 per semester. (Academic year)

57–58 **Graphics I** (3–3) Griffith, Wright
Exploration of the methods of intaglio, relief, printing, and other composite processes. Material fee, $21 per semester. (Academic year)

61–62 **Water Color** (3–3)
Painting in transparent and opaque water color and in acrylic. Experimentation, figurative and landscape. (Academic year)

* May be repeated for credit.
† Required of all Fine Arts majors.

65–66 **Painting I** (3–3) **Smith**

Emphasis on personal expression with exposure to a variety of styles. Use of acrylic and oil. Material fee, $15 per semester. (Academic year)

81–82 **Sculpture I** (3–3) **Gates**

Three-dimensional design. Basic sculptural techniques; modeling, carving, and construction. Media include wood, clay, stone, plaster. Laboratory fee, $24 per semester. (Academic year)

Second Group

Second-group art courses may be repeated for credit with approval of department.

123–24 **Design II: Individual Problems** (3–3) **Staff**

Emphasis on problems and materials of specific interest to the student in any area of fine arts. Laboratory fee depending on area chosen.* Departmental permission required. (Academic year)

125–26 **Painting II** (3–3) **Smith**

Emphasis on personal expression; exposure to a variety of styles. Materials and techniques subordinate to individual experimentation. Use of acrylic and oil. Material fee, $15 per semester. (Academic year)

127–28 **Painting III** (3–3) **Woodward**

Exploration of problems in developing a personal visual imagery. Material fee, $15 per semester. (Academic year)

131–32 **Ceramics II** (3–3) **Ozdogan**

Continuation of basic ceramic building techniques and laboratory activities. Introduction to basic wheel-throwing. Laboratory fee, $54 per semester. (Academic year)

133 **Ceramic Decoration** (3) **Ozdogan**

Aesthetic and technical development of surface decoration, with experimental projects in sgraffito, mishima, engobe, majolica, underglaze, overglaze, and relief techniques. Laboratory fee, $54 per semester. (Fall)

134 **History of Photography** (3) **Staff**

(Spring)

135–36 **Advanced Water Color** (3–3)

Development of techniques of water color; concentration on special projects. (Academic year)

137 **Workshop in Materials, Methods, and Techniques** (3) Woodward, Smith

Technical investigation of painting methods from the 14th century to the present. Preparation of grounds, media, underpainting, glazing. Laboratory fee, $15. (Fall and spring)

*Schedule of Fees: Ceramics—$54; 2-D Design—none; 3-D Design—$24; Drawing—$21; Graphics—1; Sculpture—$24; Typography—$30; Painting—none; Photography—$36; Visual Communication—0.

138 Graphics: History and Practice (3) Griffi
Laboratory fee, $21.

139 Fiber and Textile Workshop (3)

141 Interior Design (3) Teller and St

142 House Planning (3) St

143–44 Serigraphy (3–3) Tel
Advanced problems in serigraphy; emphasis on its aesthetic poss bilities. Prerequisite: Art 57–58. Laboratory fee, $21 per semest (Academic year)

146 Ceramic Restoration and Conservation (3) Ozdoga
All methods and techniques. Student projects include surface and structural repairs with laboratory tests and activities. Laboratory fee, $54. (Spring)

151–52 Ceramics III (3–3) Ozdo
Developing quality and creativity with emphasis on achieving hi standards of craftsmanship in hand-building and wheel-throwin Laboratory tests and activities. Laboratory fee, $54 per semest (Academic year)

153–54 Graphics II (3–3) Griffith, Wrigh
Advanced relief, intaglio, and other composite processes. Prerequisite Art 57–58. Material fee, $21 per semester. (Academic year)

157–58 Graphics III (3–3) Griffith
Exploration of combined techniques and mixed media. Prerequisite Art 153–54. Material fee, $21 per semester. (Academic year)

159–60 Drawing II (3–3) Wrigh
Development of drawing. Individual study, application and extensions of drawing. Material fee, $21 per semester. (Academic year)

163–64 Design: Visual Communication I (3–3) Molina
Layouts and execution in client-presentation form of various graphic design projects—brochures, bookjackets, displays, title graphics for film media. Material fee, $21 per semester. (Academic year)

166 Advanced Drawing Techniques (3) Smith
Laboratory fee, $21.

171 Typography I (3) Molina
Techniques of hand lettering, traditional and contemporary. Explora tion of the decorative potential in lettering. Material fee, $21 (Fall)

172 Typography II (3) Molina
Study of type classification, recognition, and adaption. Methods of copy fitting and type reproduction processes. Typographic layout and specification. Material fee, $21. (Spring)

174 Design: Visual Communication II (3) Molina
Material fee, $21.





175 **Lithography** (3) Staff
Material fee, $21.

177–78 **Survey of Printing and Illustration** (3–3) Staff
Exposure to a maximum range of illustrative processes, both practical and theoretical. Technical aspects of commercial printing processes; methods of preparation of artwork, photographs, and typographic proofs for commercial reproduction. (Academic year)

179–80 **Sculpture II** (3–3) Gates
Concepts of sculpture; new materials and developments. Laboratory fee, $24 per semester. (Academic year)

181–82 **Intermediate Photography** (3–3) Lake
Basic problems. Introduction to color photography with emphasis on creative expression. Prerequisite: Art 23–24 or permission of instructor. Laboratory fee, $36 per semester. (Academic year)

183 **Intermediate Black and White Photography** (3)
Emphasis on role of ideas in black and white photography. Critiques designed to encourage development of an individual style. Prerequisite: Art 23–24 or permission of instructor. Laboratory fee, $30. (Fall and spring)

185–86 **Painting and Drawing** (3–3)
Techniques of drawing and painting in oil, acrylic, and water color. Work from life model and still life. Material fee, $15 per semester.

189–90 **Sculpture III** (3–3) Gates
Advanced study concentrating on relevance of scale and media. Relationship of sculpture to the environment. Laboratory fee, $24 per semester. (Academic year)

193–94 **Film Making** (3–3)
Basic techniques and procedures in film making. Each student will create a short film. Art 193 is prerequisite for Art 194. (Academic year)

*195 **Documentary Photography** (3) Lake and Staff
Social problems, team-taught. Each student will work on projects with social dimensions. Laboratory fee, $36. Admission by permission of instructor. Limited enrollment. (Spring)

197–98 **History of Photography** (3–3)
Discussion of major figures and movements in the history of photography.

Third Group

All third-group art courses may be repeated for credit with the approval of the department.

205 **Advanced Photography** (3) Lake
Advanced problems in photography; emphasis on individual develop-

* Interdepartmental course offered by the Art and Journalism Departments.

ment. Prerequisite: Art 181–82 or permission of instructor. Laborato
fee, $36 per semester. (Fall and spring)

206 **Photography: Special Projects** (3) Lab
Laboratory fee, $36.

208 **Advanced Photography** (3)
Advanced problems in photography; emphasis on individual develop
ment. Prerequisite: Art 181–82 or permission of instructor. Laborato
fee, $30. (Fall and spring)

209–10 **Exhibition and Display Design** (3–3) Mille

224 **Ceramic Sculpture** (3) Ozdoga
Principles of sculptural design in clay. Bibelot, garden ceramics, an
figurative forms. Laboratory fee, $54.

225 **Special Projects in Ceramics** (3)
(Formerly Ceramic Restoration)
Laboratory fee, $54.

226 **Architectural Ceramics** (3) Ozdoga
Advanced studies in ceramic sculpture oriented toward architectural
concepts. Laboratory tests and activities. Laboratory fee, $54.

231–32 **Design III** (3–3) Gate
New media and techniques in three-dimensional design. Laboratory
fee, $24 per semester. (Academic year)

234 **Design IV** (3) Staff
Presentation, model building, and specifications of materials in three-
dimensional problems. (Fall and spring)

235 **Design V** (3) Teller
Designing and executing textiles using the techniques of silk scre
block print, and batik. (Fall and spring)

248 **Independent Research in Fine Arts** (3)
For master's degree candidates; open to limited number of qualified
undergraduates, with permission. Independent research arranged in
consultation with individual instructor and graduate advisor. May be
repeated for credit. Laboratory fee depending on area chosen.*
(Fall and spring)

249 **Theory of Design** (3) Teller
Application of design principles to painting, architecture, sculpture,
and minor arts of today. Relationship of design principles to con-
temporary artists and their works. Open to undergraduate students
with permission of instructor. (Fall)

251–52 **Ceramics IV** (3–3) Ozdoga
Advanced individual projects. Directed studies in specific areas.
Laboratory tests and activities. Laboratory fee, $54 per semester.

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* *Schedule of Fees*: Ceramics—$54; 2-D Design—none; 3-D Design—$24; Drawing—$21; Graphics—$21; Sculpture—$24; Typography—$30; Painting—none; Photography—$36; Visual Communication—$30; Serigraphic Techniques—$21.

253 **Ceramics V** (3) — Ozdogan
Establishment of an individual style and specialization. Emphasis on meeting professional standards. Laboratory tests and activities. Laboratory fee, $54.

254 **Ceramic Glazes: Calculation and Formulation** (3) — Glassman
Laboratory fee, $15.

255–56 **Graphics IV: Serigraphy** (3–3) — Teller
Prerequisite: Art 157–58. Laboratory fee, $21 per semester. (Academic year)

257–58 **Graphics V: Etching and Engraving** (3–3) — Griffith
Prerequisite: Art 157–58. Material fee, $21 per semester. (Academic year)

259 **Graphics VI: Lithography** (3) — Wright
Material fee, $21. (Fall and spring)

260 **Graphics VII: Relief Printing** (3) — Griffith
Material fee, $21. (Fall and spring)

265–66 **Painting IV** (3–3) — Woodward
Creative painting; students work on independent projects as well as assigned problems. Material and model fee, $15 per semester. (Academic year)

267–68 **Individual Problems in Photography** (3–3) — Lake and Staff
Instruction and professional guidance relevant to individual projects. Laboratory fee, $36 per semester. Prerequisite: Permission of instructor. (Academic year)

275 **Painting V** (3) — Woodward
Material and model fee, $15.

277–78 **Design: Advanced Visual Communication** (3–3) — Molina
Design and execution of graphic design projects, including magazine spreads, posters, advertisements, trademarks, letterheads, packages. Psychological and symbolic aspects of design solutions. Laboratory fee, $30 per semester. (Academic year)

279–80 **Sculpture IV** (3–3) — Gates
Laboratory fee, $24. (Academic year)

281 **Sculpture V** (3) — Gates
Laboratory fee, $24. (Fall and spring)

299–300 **Thesis Research** (3–3) — Staff
Laboratory fee depending on area chosen.* (Fall and spring)

* *Schedule of Fees:* Ceramics—$54; 2-D Design—none; 3-D Design—$24; Drawing—$21; Graphics—$21; Sculpture—$24; Typography—$30; Painting—none; Photography—$36; Visual Communication—$30; Serigraphy—$21.

ART THERAPY—GRADUATE PROGRAM

Professor B.I. Levy *(Program Director)*
Adjunct Assistant Professors H.Y. Kwiatkowska, E. Ulman *(Coordinator of Training)*
Assistant Professorial Lecturers E. Kramer, J. Krash
Lecturers W. Maiorana, K. Williams
Clinical Instructors C.E. Powell, C.W. Wang, B.J. Clifford, E.J. Donnellan, S. Fishman, L. Gantt, G. Haugan, D.F. Mindlin, R.A. Wolff, M.S. Schmal, B. Holly, Jr., M. Kreshover, B. Zeiger, M. Fleming, P. Rossiter, C. Smith

Master of Arts in the field of Art Therapy—Prerequisite: a bachelor's degree evidence of significant training and/or experience in the arts, including painting, drawing, and clay modeling; course work in the behavioral and/or social sciences, including personality theory, abnormal psychology, and child psychology.

Required: the general requirements, pages 90–98. Prospective candidates should consult the brochure which describes the program for specific requirements.

Fields of emphasis: adult art therapy, family art therapy, child art therapy, and research.

201 **Introduction to Art Therapy** (3) Ulman
Lectures, presentation of illustrative case material, class discussion of assigned readings. Survey covering range of art therapy practice, diagnostic and treatment approaches, historical development, main theoretical trends. Open only to degree candidates. (Fall)

202 **Case Studies in Art Therapy** (3) Ulman
Discussion of case material provided by students in order to refine methods of working, improve written and oral reports. Instructor and other practitioners may provide supplementary illustrative material. Assigned reading (Spring)

203 **Technique of Art Therapy** (3) Kwiatkowska
Art therapy approaches with individuals and groups of different diagnostic categories in various settings presented through illustrative clinical examples. Students experiment with numerous techniques through the use of art materials. Open only to degree candidates. (Fall)

204 **The Freudian Model in Art Therapy** (3)
Kramer, Kwiatkowska, Ulman
Concepts of instinctual drives; ego development; defense mechanisms; sublimation; transference and countertransference; maturation and regression applied to work with children, adults, families, and groups. (Spring)

205–6 **Family Art Techniques** (3–3) Kwiatkowska
Principles of family art therapy as adjunctive and primary treatment; art techniques for evaluation of family dynamics. Students participate in working with families. Prerequisite: ArTh 201 and 203, or 211, or permission of instructor. (Academic year)

207–8 **Art as Therapy with Children** (3–3) Maiorana, Kramer
Lectures, presentation of case material, studio work, class discussion of assigned reading. Special considerations of work in art therapy

with children will be explored from the theoretical and practical standpoints. Prerequisite: ArTh 201 and 203, or 211, or permission of instructor. (Academic year)

211 Survey of Art Therapy (3) Maiorana, Smith, Williams

Use of visual arts to enhance personal development; history, theories, range of practice in art therapy. Illustrated lectures, reading, discussion, studio work. For students not intending to specialize in art therapy. Open to advanced undergraduates with permission of instructor. (Fall and spring)

218 Seminar: Systems of Psychotherapy (3) Silber

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. Prerequisite: ArTh 201 and 203, or 211, or permission of instructor. (Spring)

275 Group Art Therapy (3) Staff

Learning about the contribution of art to group process by investigating experience as member and leader of an art-centered group. Prerequisite: ArTh 201 and 203. Open to students who have completed ArTh 211 and to others with permission of instructors. May be repeated for credit with advisor's approval. (Fall and spring)

283–84 Practicum in Art Therapy (3–3) Staff

Minimum of 300 hours' field work connected with service to clients. On-the-job supervision supplemented by group supervision from the art therapy staff. Prerequisite: ArTh 201 and 203, or 211. Open only to degree candidates.

285 Special Projects in Art Therapy (3) Staff

Individual work based on study, research, or practice. Details to be worked out with each student. Resource people may be called upon to assist, as appropriate. May be repeated for credit with approval of advisor.

290–91 Workshops in Art Therapy (3–3) Staff

Art therapists and other mental health professionals will conduct four weekend workshops during each semester. Emphasis on the elucidation of concepts of treatment through lecture, discussion, and participation. Students registered in the Art Therapy Program aid in selection of subjects and leaders. Students may register for either 290 or 291, or both. (Academic year)

ASTRONOMY

See **Physics.**

BIOCHEMISTRY—GRADUATE PROGRAMS

Professors B.W. Smith, G.V. Vahouny, J.M. Bailey
Associate Professor G.A. Walker
Assistant Professor L.L. Gallo

Master of Science in the field of Biochemistry—Prerequisite: a bachelor's degree. The undergraduate program must have included the following courses or equivalent: BiSc 11–12; Chem 11–12, 22, 151–52, 153–54; Phys 1, 2.

Required: the general requirements, pages 90–98, including Bioc 221–22, 227, 299–300. The remaining courses are to be selected from Bioc 224, 232, 241, 262, 295; or, with the approval of the advisor, from graduate courses in chemistry, microbiology, physiology, or pharmacology. It is expected that students will complete all of the required work in approximately two years.

Doctor of Philosophy in the field of Biochemistry—Required: the general requirements, pages 90–92, 98–100.

Research fields: amino acid metabolism; animal nutrition; biochemical evolution; biochemistry of cancer; biochemistry of tissue culture; carbohydrate metabolism; chemistry and metabolism of carbohydrates, lipids, proteins; complex lipids; endocrinology; intermediary metabolism; lipids; metabolic relationships of insulin; metabolism; metabolism of connective tissue; metabolism of purines and pyrimidines; neurochemistry; nutrition; protein biosynthesis; protein metabolism; tissue respiration; and vitamins.

221–22 **General Biochemistry** (3–4) Gallo, Vahouny, and Staff

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Generally, graduate students must register concurrently for Bioc 223 and for Bioc 224. However, graduate students taking Bioc 225–26, ForS 281–82, Micr 241–42 or Phys 223–24 may register for Bioc 221–22 without the laboratory. With specific recommendations by the undergraduate advisor and the department, undergraduate students may register for Bioc 221–22 without laboratory. Prerequisite: Chem 152, 154. (Academic year)

223–24 **Biochemistry Laboratory** (1–1) Gallo and Staff

Laboratory complement of Bioc 221–22. Concurrent registration in Bioc 221-22 required. Materials fee, $20 a semester. (Academic year)

*225–26 **Biomedical Instrumentation** (4–4) Smith and Staff

Same as ForS 281–82, Micr 241–42 and Phys 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

227 **Biochemistry Seminar** (1) Bailey

Current literature in biochemistry. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

229 **Biochemistry of Enzymes** (1) E. Anderson

Two separate courses are offered in alternate years, each covering both general and advanced material; students may register for these in either order and cover the entire content in two years. The full content includes practical handling of enzymes, kinetics, reaction mechanisms, active site, isozymes, regulation, and other special topics. Prerequisite: Bioc 221. (Fall)

232 **Protein Chemistry I** (1) Steers, Schechter

An introduction to the theory and methods of protein chemistry, in-

* An interdisciplinary course offered by the Biochemistry, Forensic Sciences, Microbiology, and Physiology Departments.

cluding techniques of protein purification, sequencing and characterization by physico-chemical methods. Prerequisite: Bioc 221. (Fall)

233 Protein Chemistry II (1) Steers, Schechter

Continuation of Bioc 232. The study of structure-function relations in proteins, including methods of analysis of conformation, enzymatic activity and the role of proteins in various biological processes. (Spring)

241 Isotopes (3) Staff

Theoretical characterization of isotopes and their application in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee, $18. (Spring)

252 Biochemistry of the Brain (1) Staff

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 Human Nutrition (1)

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 Biochemistry of Organ Function (1) N. Kramer*

For medical students; open to limited number of graduate students. Emphasis on biochemical processes unique to particular organ systems; application of these processes to evaluation of function. (Spring)

260 Biochemistry of the Steroids (1) O. Dodek†

For medical students; open to limited number of graduate students. Basic chemistry of the steroids, pathways of biosynthesis and metabolism, regulatory mechanisms, physiologic effects, clinical measurements of endogenous steroids, clinical manifestations of steroid imbalance, steroid changes in pregnancy, and steroid therapy. (Spring)

262 Biochemistry of the Lipids (1) Vahouny

Discussion of topics of current interest, including digestion, energy production, biosynthesis, function in specialized tissues, and subcellular particles. Content differs each time course is offered; may be repeated for credit. (Spring)

264 Membrane-Associated Complex Lipids (1) P. Fishman‡

Topics will cover the catabolism and biosynthesis of complex sphingolipids; inherited metabolic diseases associated with abnormal sphingolipid metabolism; altered glycosphingolipid biosynthesis associated with malignant transformation; potential roles of gangliosides as membrane receptors for toxins and hormones; aspects of membrane structure and biochemistry.

Dr. Kramer is Professor of Medicine in the School of Medicine and Health Sciences.
Dr. Dodek is Assistant Clinical Professor of Obstetrics and Gynecology in the School of Medicine and Health Sciences.
Dr. Fishman is Lecturer in Biochemistry in the School of Medicine and Health Sciences.

266 **Biochemical Genetics and Inherited Metabolic Diseases** (1) C. Merri

For medical students; open to limited number of graduate student Biochemical aspects of genetics and contributions of molecular biol ogy to understanding of human mutations and hereditary disease (Spring)

*268 **Muscle Contraction: Physiological and Biochemical Aspects** (2) Walker, Fran

Anatomical, biochemical, pharmacological, and physiological aspect of muscle contraction. Prerequisite: an introductory course in bio chemistry and physiology, or permission of the departmen (Spring)

295 **Research in Biochemistry** (arr.) Staff

Participation in a project under investigation in the department o one in a related field suggested by the student and approved by the staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

BIOLOGICAL SCIENCES

Professors R.L. Weintraub *(Emeritus)*, K.F. Parker *(Emeritus)*, S.O. Schiff *(Chairman)*

Adjunct Professors T.E. Bowman, M.L. Jones, L.S. Kornicker, H.A. Rehder, F.A. Chace, Jr., R. Manning, C.G. McWright

Professorial Lecturers K.C. Kates, R.S. Sigafoos, W.A. Shropshire, Jr., J.C Petricciani

Associate Professors D.L. Atkins, R.E. Knowlton, H. Merchant, R.K. Packer, T.L. Hufford

Adjunct Associate Professors W.D. Hope, D.L. Pawson, J. Rosewater, C.F Roper, M. Rice

Associate Professorial Lecturers P.E. Spiegler, J.C.C. Dickens, B.M. Timberlake

Assistant Professors R.P. Seifert, D.E. Johnson, A.L. Mescher, R. Donaldson

Assistant Professorial Lecturers D.A.P. Houston, B. Brown, K. Hellman R.L. Phipps

Lecturers D.L. Neugebauer, H.M. Padilla

Bachelor of Arts or Bachelor of Science with a major in biology, botany or zoology (departmental)—The following requirements must be fulfilled:

* An interdisciplinary course offered by the Physiology and Biochemistry Departments.

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the social studies and the humanities.)

2. Prerequisite courses—BiSc 11 12, or equivalent.

3. Required courses in related areas—Chem 11–12; Chem 151–52 and 153–54, or 50. (The following courses are strongly recommended: Math 31; Phys 1, 2; two years of French, German, or Russian; Stat 91 or 127.)

4. (a) Required courses for the major in biology –a minimum of 24 semester hours of second-group courses, which should include at least six hours in biology, six in botany, and six in zoology.

(b) Required courses for the major in botany—a minimum of 24 semester hours of second-group courses; a minimum of 12 hours must be taken in botany, and no more than one zoology course may be included.

(c) Required courses for the major in zoology—a minimum of 24 semester hours of second-group courses; a minimum of 12 hours must be taken in zoology, and no more than one botany course may be included.

Master of Science in the field of biology, botany, or zoology—Prerequisite: a bachelor's degree with a major in one of the following from this University, or an equivalent degree: (1) *Biology field*—an undergraduate major in biology, botany or zoology; (2) *Botany field*—an undergraduate major in botany or biology; (3) *Zoology field*—an undergraduate major in zoology or biology. The undergraduate program must have included the following courses, or equivalent: Chem 151–52 and 153–54, or 50; Math 31; Phys 1, 2.

Required: the general requirements, pages 90–98. The minimum requirement consists of 24 semester hours of approved course work plus a thesis (equivalent to six semester hours). With the permission of the department a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Master of Arts in the field of Museum Studies, with specialization in the biological sciences, see pages 383–84.

Doctor of Philosophy in the field of biology, botany or zoology—Required: the general requirements, pages 90–92, 98–100, plus satisfactory completion of a Preliminary Examination and the General Examination in four areas of biology. The program of study, fields of study, and tool subjects are determined in consultation with an advisory committee appointed for each candidate.

Research fields in Biology: cell physiology, cytogenetics, developmental genetics, and molecular genetics.

Research fields in Botany: photobiology, phycology, plant ecology, plant physiology (microorganisms), plant physiology (vascular plants), and taxonomy.

Research fields in Zoology: animal ecology, bioenergetics; comparative neuroanatomy; comparative physiology; herpetology; histophysiology; invertebrate zoology; marine biology; radiation biology; taxonomy, anatomy and physiology of mollusks; vertebrate anatomy and taxonomy; vertebrate embryology and morphogenesis; vertebrate ichthyology; and vertebrate physiology.

Bachelor of Arts in Education with a teaching field in biology—Prerequisite: the education curriculum, pages 113–14.

Required: the biology option and the professional courses listed on page 117.

Departmental prerequisite: BiSc 11 12 or equivalent is prerequisite to all second-group courses in biology, botany and zoology, except by permission of the instructor.

BIOLOGY

First Group

3–4 Introductory Biology for Nonscience Majors (3–3) Schiff

Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in the environment. Prerequisite to BiSc 4: BiSc 3. Material fee, $18 per semester. (Academic year)

11–12 Introductory Biology for Science Majors (4–4) Merchant

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $24 per semester. (Academic year)

***26 Environmental Issues** (3) Merchant

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Fall and spring)

33 Plants, Man, and Life (3) Hufford

Plants by which man lives and upon which he depends for his food, shelter, medicine, clothing, and industries, as well as his drugs and drinks. (Spring)

Second Group

103 Marine Biology (4) Knowlton

Lecture (2 hours), laboratory and field (3 hours), plus some extended field trips. Study of relationships between organisms and physical, chemical, and biological factors of the marine environment. Consideration of the open ocean and coastal eco-systems and man's influence on them. Recommended prerequisite: BiSc 101 or 102, 106, 140. Material fee, $24. (Spring)

107 Field Biology (4) Merchant

(Formerly 6 credit hours)

Field study of altitudinal zonation, species hybridization, territoriality, energy balance, time and energy budgeting, effects of exposure, and effects of introduction of alien species on flora and fauna of Great Smoky Mountains National Park. (Summer)

108 Organic Evolution (3) Seifert

Synthetic theory of organic evolution including treatment of speciation, adaptive radiation, biogeography, population biology, sociality, and human evolution. (Spring)

111 Introductory Microbiology (4) Staff

Lecture (2 hours), laboratory (4 hours). Survey of the major groups of microorganisms with emphasis on structure, physiology, ecology,

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* Offered jointly by the Division of Experimental Programs and the Departments of Biological Sciences and Geography and Regional Science.

phylogenetic relationships, and economic importance. Prerequisite: one year of chemistry. Material fee, $24. (Fall and spring)

122 **Cell Biology I: Molecular and Subcellular Biology** (3) Donaldson

Structure and function of biological molecules, viruses, and cellular organelles. Prerequisite: one semester of organic chemistry. (Spring)

123 **Cell Biology II: Cell Biochemistry** (3) Donaldson

Introduction to the metabolism of generalized cells of animals, plants, and microorganisms, including energetics, enzymes, respiration, biosyntheses, and regulatory mechanisms. Prerequisite: one semester of organic chemistry. (Fall)

124 **Cell Biology II: Cell Biochemistry Laboratory** (2) Donaldson

(Formerly 1 credit)

Designed to illustrate some of the principles and techniques of biochemical experimentation. Prerequisite or concurrent registration: BiSc 123. Material fee, $24. (Fall)

127 **Genetics** (3) Johnson

Introductory course. Basic aspects of transmission of genetic traits with particular reference to the chemical basis of heredity and gene action. (Fall and spring)

128 **Genetics Laboratory** (1) Johnson

Study of genetic principles using Drosophila, *E. coli*, and lambda phage. Prerequisite or concurrent registration: BiSc 127. Material fee, $24. (Fall and spring)

129 **Cell Biology III: Cell Physiology** (3) Donaldson

Study of cell processes, including growth, division, differentiation, interactions, aging, movements, energy perception and transduction, luminescence. (Spring, odd years)

130 **Cell Biology III: Cell Physiology Laboratory** (1) Donaldson

Exercises to illustrate some principles and techniques. Prerequisite or concurrent registration: BiSc 129. Material fee, $24. (Spring, odd years)

138 **Advanced Genetics** (3) Johnson

Emphasis on the use of genetic analysis in solving modern biological problems. Prerequisite: introductory course in genetics. (Spring)

140 **General Ecology** (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Introduction to the concepts of limiting factors, biogeochemical cycles, trophic levels, and energy transfer, and their relationship to the structure and function of population, species, communities, and ecosystems. Material fee, $24. (Fall)

144 **Aquatic Ecology** (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Principles applied to aquatic systems with special references to physiochemical properties, typical habitats and communities. Laboratory fee, $24. (Spring, odd years)

167 **Radiation Biology** (3) Schil
Chemical, physical, and biological aspects of radiation; effects o radiation on cells and organisms, with emphasis on mammals; genet effects. Recommended: two years of biological sciences, and chemis try or physics. (Fall)

171 **Undergraduate Research** (arr.) Staf
Admission by permission of the staff member concerned. May be re peated for credit. Prerequisite: Chem 50 or 152; 16 semester hours i Biological Science courses. Material fee, $20 per semester hour (Fall and spring)

172 **Independent Study in Cell and Molecular Biology** (2) Staf
Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

173 **Independent Study in Developmental Biology** (2) Staf
Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

174 **Independent Study in Organismic Biology** (2) Staf
Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

175 **Independent Study in Genetic and Evolutionary Biology** (2) Staf
Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

176 **Independent Study in Environmental Biology** (2) Staff
Prescribed reading list and consultations with staff adviser culminating in a written report and/or examination. (Fall and spring)

181–82 **Senior Seminar** (1–1) Staff
Lectures and discussions on current biological problems. (Acad demic year)

185 **Human Nutrition** (3) Donaldson
Dietary requirements and their underlying physiological and bio chemical bases; composition of natural and modified foodstuffs and additives; social and economic aspects of nutrition. (Fall)

Third Group

206 **Seminar: Radiation Biology** (3) Shropshire
Actions of radiation at subcellular, cellular, and organismal levels factors modifying radiation damage; practical considerations in radia tion exposure. Prerequisite: BiSc 167 or equivalent. (Spring)

207 **Seminar: Origin of Life** (3) Staff
Review of experiments and speculations concerning origin of life and molecular aspects of biological evolution. (Spring, odd years)

208 **Bioenergetics** (3) Merchant
Study of energy fixation and transfer in ecosystems and of their role in behavior, evolution, population dynamics, and species interactions. Prerequisite: BiSc 140 or equivalent. (Fall, odd years)

209 **Seminar: Principles and Mechanisms of Organic Evolution** (3) — Seifert

Principles and mechanisms of evolution in animals and plants; population phenomena, speciation, and evolution above the species level. (Fall, even years)

220 **Seminar: Cell Physiology** (3) — Donaldson

Review in depth of selected topics. May be repeated for credit. (Fall)

227 **Seminar: Genetics** (3) — Johnson

Current problems in genetics. Students are required to present one seminar covering the full class period. May be repeated for credit. (Fall, odd years)

228 **Population Genetics** (3) — Johnson

Consequences of Mendelian inheritance on the population level as exemplified by gene frequencies, random mating, inbreeding, differential fertility and mutations. (Fall, even years)

229 **Cytogenetics** (3) — Staff

Behavior of chromosomes in mitosis and meiosis as a basis for the transmission of genes from one generation to the next through reproduction and the influence of cytogenetic processes on the mechanisms of evolution. (Fall)

243 **Seminar: Ecology** (3) — Merchant

In-depth study of selected topics, including reports on original publications. May be repeated for credit. Prerequisite: BiSc 140 or equivalent. (Spring, even years)

248 **Analysis of Development** (3) — Mescher

Survey of current research in experimental morphology, developmental genetics, biochemical development, and developmental endocrinology. Prerequisite: BiSc 146 or equivalent. (Fall)

249 **Seminar: Developmental Biology** (3) — Mescher

Discussion and reports on current literature in developmental biology, with emphasis on developmental genetics. Prerequisite: at least one course each in developmental biology and genetics. (Spring)

250 **Principles and Techniques of Systematics** (3) — Seifert

Examination of the procedures of systematic nomenclature. A study of the methods and rationale used in estimating phenetic and phyletic relationships and in constructing classifications and evolutionary trees. Prerequisite: BiSc 108 or permission of instructor.

255 **Seminar: Consortium Biology** (2)

Topic to be announced in *Schedule of Classes*. (Spring)

295 **Research** (arr.) — Staff

Investigation of special problems. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) — Staff

(Fall and spring)

Fourth Group

398 Advanced Reading and Research (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

BOTANY

Second Group

105 Local Flora (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Field and laboratory studies on local flora; emphasis on the woody plants. Material fee $20. (Fall)

106 Field Botany—Lower Plants (4) Hufford
Lecture (2 hours), laboratory and field (4 hours). Primarily for non-specialists, emphasizing algae, mosses, and ferns. Material fee, $18. (Alternate summers)

109 Developmental Plant Anatomy (4) Hufford
Demonstration, observation, discussion (6 hours). Initiation and ontogeny of tissues and organs of vascular plants. Material fee, $20. (Spring)

110 Comparative Plant Morphology (4) Hufford
Demonstration, observation, discussion (6 hours). Evolutionary morphology and life histories as a basis for a phylogenetic study and the critical roles plants have in human welfare. Material fee, $20. (Fall)

125 Flowering Plants (4) Parker
Lecture (2 hours), laboratory and field (4 hours). Origin, evolutionary development, and principles of systematics of flowering plants. Material fee, $20. (Spring)

135 Plant Physiology (4) Donaldson
Lecture (2 hours), laboratory (4 hours). Physiology of seed plants with emphasis on growth, development, tropisms, and reproduction. Prerequisite: Chem 11–12. Recommended: Chem 50 or 151–52. Material fee, $24. (Spring)

137 Horticulture (4) Parker
Lecture (2 hours), laboratory (4 hours). Basic principles of growth, propagation, and care of ornamental plants. Material fee, $20. (Fall and spring)

141 Plant Ecology (4) Phipps
Lecture (2 hours), laboratory (4 hours). Prerequisite: BiSc 105, 125, and 3 hours of geology. Several Saturday and weekend fieldtrips required. Material fee, $18. (Fall, even years)

149 **Freshwater Algae** (4) — Hufford

Observation and discussion (6 hours). Systematics, morphology, physiology, and water quality interrelationships of freshwater algae. Field experience, including at least one weekend field trip. Material fee, $18. (Fall, odd years)

Third Group

221 **Seminar: Systematics of Flowering Plants** (3) — Parker

(Formerly Seminar: Systematics)

Review of current work in various disciplines of systematic research: topics of special interest to participants. May be repeated for credit. (Fall, odd years)

237 **Water Pollution Biology** (3) — Hufford

(Formerly Seminar: Water Pollution Biology)

Review of current research in water quality and water pollution biology. (Fall, even years)

238 **Seminar: Current Topics in Phycology** (3) — Hufford

(Spring, odd years)

242 **Seminar: Plant Ecology** (3) — Staff

(Spring, even years)

251 **Freshwater Diatoms** (4) — Hufford

(Formerly BiSc 150)

Observation and discussion (6 hours). Taxonomy, morphology, and ecology of freshwater diatoms. Field experience. Material fee, $20. (Spring, even years)

299–300 **Thesis Research** (3–3) — Staff

(Fall and spring)

ZOOLOGY

Second Group

101 **Invertebrate Zoology** (4) — Knowlton

Lecture (2 hours), laboratory (4 hours). General survey of invertebrate animals, including classification, morphology, physiology, embryology, and evolutionary relationships among phyla. Material fee, $24. (Fall)

102 **Advanced Invertebrate Zoology** (4) — Knowlton

Lecture (2 hours), laboratory and field (4 hours). Study of invertebrate systems (cells, tissues, organs, organisms), with emphasis on functional aspects (physiology and ecology) and taxonomy of important groups. Prerequisite: BISc 101 or equivalent. Material fee, $24. (Spring)

104 **Comparative Vertebrate Anatomy** (4) — Atkins

Lecture (2 hours), laboratory (4 hours). Evolution and comparative morphology of chordata, stressing recent forms. Material fee, $24. (Fall and spring)

143 Animal Ecology (4) Merchant

Lecture (3 hours), laboratory and field (3 hours). Application of ecological principles to the understanding and manipulation of animal populations. Prerequisite: BiSc 140 or permission of instructor. Laboratory fee, $24. (Spring, even years)

145 Introduction to Vertebrate Embryology (4) Mescher

Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $24. (Fall)

146 Experimental Developmental Biology (4) Mescher

Lecture (2 hours), laboratory (4 hours). Introduction to the experimental, biochemical, and genetic analysis of developing systems through examination of the literature and laboratory experiments. Prerequisite: BiSc 145 or equivalent, or permission of instructor. Recommended: a course in cell biology or genetics and Chem 50 or 151–52. Laboratory fee, $24. (Spring)

148 Histology (4) Staff

Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $24. (Fall and spring)

153 Survey of Neurobiology (4) Atkins

Lecture (2 hours), laboratory (3 hours). Study of the gross and cellular anatomy, physiology, and biochemistry of the nervous system; emphasis on mammals. Prerequisite: BiSc 104. Material fee, $24. (Spring, odd years)

155 Parasitology (4) Kates

Lecture (2 hours), laboratory (4 hours). Introduction to animal parasitology; survey of parasitic types from protozoa through arthropods. Material fee, $20. (Fall, even years)

156 Ichthyology (4) Collette

General biology of fishes, including structure, function, distribution and evolution, with emphasis on adaptations. Prerequisite: background in comparative anatomy and vertebrate zoology, or permission of instructor. (Spring)

157 Comparative Endocrinology (3) Staff

Comparative study of basic principles of chemical integration, neuroendocrine relationships, and mechanisms of hormone action. Prerequisite: BiSc 104, 165 and/or concurrent registration in Chem 151–52 or Chem 50. (Spring)

161 Entomology (4) Seifert

Lecture (2 hours), laboratory (4 hours). The biology of insects, including their morphology, physiology, development, behavior, and ecology. Material fee, $20. (Fall)

162 Insect Population and Evolutionary Biology (4) Seifert

Lecture (3 hours), laboratory (3 hours). Study of the interactions of insects with other organisms and the effects these interactions have

on insect evolution. Insects as disease vectors, as pollinators, mimetic systems will be discussed. Prerequisite: BiSc 161 or permission of instructor. Material fee, $20. (Spring)

163 **Human Physiology** (3) Packer
Introduction to the function of organ systems of the human body. (Fall)

164 **Human Physiology Laboratory** (1) Packer
Study of basic physiology laboratory techniques; emphasis on the experimental study of homeostatic mechanisms in humans. Prerequisite or concurrent registration: BiSc 163. Material fee, $28. (Fall

165 **Vertebrate Physiology** (4) Packer
Lecture (3 hours), laboratory (3 hours). Detailed study of selected organ systems, stressing chemical and physical bases. Prerequisite: BiSc 163 and 164, or equivalent. Prerequisite or concurrent registration: Chem 151–52 or 50. Material fee, $28. (Spring)

Third Group

204 **Seminar: Invertebrate Zoology** (3) Knowlton
Review of selected topics in physiology, development, and ecology of invertebrate animals, including reports on original publications. May be repeated for credit. (Fall)

*205 **Comparative Pathology** (3) Zook
An introduction to the study of disease and disease mechanisms in vertebrates, and comparison with disease in man. Recommended: courses in anatomy, histology, and physiology. (Fall)

210 **Animal Behavior** (3) Staff
Principles of animal behavior, including mechanisms and manifestations from simple reflex systems to social interaction. (Spring, even years)

211 **Adaptation and Natural Selection** (3) Seifert
An examination of special evolutionary problems and conflicts as well as peculiar adaptive characters of certain species. These include the evolutionary basis of sociality, sex, maleness and femaleness, and the conflict between individual and population survival. Prerequisite: BiSc 108 or permission of instructor. (Fall, odd years)

244 **Histophysiology** (3)
Study of current publications in the field of histophysiology. (Fall)

252 **Seminar: Neurobiology** (3) Atkins
Study of current publications in comparative neurobiology. (Spring, even years)

253 **Evolution of the Nervous System** (4) Atkins
Invertebrate and vertebrate nervous systems. The development of increasing complexity in neurons and systems of neurons, and the

*Interdepartmental course offered by the Biological Sciences and Pathology Departments.

establishment of alternate pathways to accomplish particular fun... tions. Lecture and laboratory. Prerequisite: BiSc 153. (Spring, odd years)

265 **Comparative Animal Physiology** (3) Packer
Survey of the physiological basis of adaptation of animals to diverse environments, emphasis on nonmammalian vertebrates. Prerequisite: BiSc 165 or equivalent. (Fall)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

BUSINESS ADMINISTRATION

Professors R.B. Eastin, E. Timbers, H.R. Page, F. Amling, G. Black, P.D. Grub, G.P. Lauter, J. Zwick, N.M. Loeser, A. El-Ansary, W.J. Keegan, B. Burdetsky, S.F. Divita *(Chairman)*
Professorial Lecturers L.C. Collins, K.F. McClure, J.P. Murphy, S. Thurm, S.S. Katz, W.E. Elrod, Jr., L. Escobar, S. Weese
Associate Professors R. Eldridge, S.N. Sherman, C.R. Miller, R.F. Dyer, W.C. Handorf, H.J. Davis, E.L. Hullander *(Visiting)*
Associate Professorial Lecturer D.A. Peterson
Assistant Professor J.M. Sachlis
Assistant Professorial Lecturers M.W. Hudgins, A.W. Musgrave, G.T. Solomon, R.L. Schweitzer
Instructors M.L. Slagle *(Visiting)*, C.W. Miller

Programs of study in business administration leading to the degrees of *Bachelor of Business Administration, Master of Business Administration, and Doctor of Business Administration* are offered by the School of Government and Business Administration (see pages 133–64).

First Group

51 **Introduction to Business** (3) Davis, Page
Structure, activities, and problems of business enterprise; its contribution to the individual and to society; careers in business. (Fall and spring)

Second Group

101 **The Business Environment** (3) Slagle, Timbers
Economic and legal environment of business enterprise: social and political influences; contemporary problems and issues. (Fall and spring)

102 **Fundamentals of Management** (3) McCarthy, Davis
Planning, organizing, directing, coordinating, and controlling activities of the administrative unit; evolution of management thinking. (Fall and spring)

105 **Personnel Management** (3) Burdetsky
The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities. (Fall and spring)

106 Leadership in Personnel Management (3) Burdetsky

A study of the philosophy, principles, policies, and programs for effective personnel management and industrial relations as portrayed by case studies drawn from business and government. Prerequisite: BAd 105 or permission of instructor. (Fall)

107 Collective Bargaining (3) Burdetsky

American unionism and collective bargaining; economic, social, and public policy considerations. The negotiation and administration of collective bargaining agreements. Prerequisite: BAd 105 or permission of instructor. (Spring)

113 Real Estate (3) Amling, Handorf

Principles of urban real estate practice; leasing and property management, valuation, appraisal, financing, taxation, urban growth, urban renewal. (Fall)

121 Fundamentals of Insurance and Risk Management (3) Staff

Function of insurance and risk management in business enterprise. (Fall)

131 Business Finance (3) Handorf, Miller, Sachlis

Analyzing capital requirements and methods of acquiring funds; planning efficient use of capital. Asset management, financial analysis, sources of funds, capital budgeting, stockholder relationships. Prerequisite: Acct 1–2; Econ 1; Math 30, 31; Stat 51. (Fall and spring)

132 International Business Finance (3) Eldridge, Hudgins

Analysis of the international economic environment and its influence on corporate financial management of international operations. (Fall and spring)

133 Capital Formation (3) Handorf, Miller

The process of capital formation in a free enterprise economy. Roles of business firms, financial intermediaries, money and capital market institutions, governmental regulatory agencies, fiscal and monetary policies. Prerequisite: BAd 131. (Spring)

138 Investment and Portfolio Management (3) Amling

Theory and principles of security analysis and portfolio management, including analysis of the national economy, industry, company, and security markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2, BAd 131. (Spring)

141 Basic Marketing Management (3) Slagle, El-Ansary, Dyer

Role of marketing in the socioeconomic system, consumer behavior analysis, impact of consumerism. Major decision areas of product planning, pricing and distribution; tools of marketing research and demand analysis. Prerequisite: Econ 1–2. Laboratory fee, $15. (Fall and spring)

143 Marketing Research (3) Lauter, Dyer

Basic methods and techniques of marketing research, problem definition, data collection, market survey and experimental design, data analysis and presentation. Special topics: attitude research, questionnaire construction and concept testing. Prerequisite: BAd 141. Laboratory fee, $15. (Spring)

144 **International Marketing Management** (3) El-Ansary, Lauter Keegan

Scope of international markets; factors in assessing world marketing opportunities; international marketing product, pricing, distribution and promotion program development in dynamic world markets and global environment. (Fall and Spring)

145 **Sales Management** (3) Staff

Organization of sales department, sales planning and forecasting quotas, territories, performance standards, and analysis and control of distribution costs. Prerequisite: BAd 141. (Fall)

147 **Advertising** (3) Thurm, Dyer

Planning an advertising campaign. Consumer and market information message appeals, media selection and scheduling, measuring effectiveness. Current criticism and regulation of the advertising function. Other major marketing communication tools, including personal selling and sales promotion, presented. (Spring and Fall)

161 **Commercial Law** (3) Collins, McClure, Murphy

Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making. (Fall and spring)

171 **Transportation and Logistics Management** Sherman

(Formerly Principles of Transportation)

Systems and alternatives of the logistics manager; carrier, user, and public policy perspectives; urban and inter-city mobility; cost, rate, competition, and service problems; public financing and regulation of carrier enterprise; coordination of the modes of transportation. (Fall)

175 **Introduction to International Business** (3) Grub, Hudgins

Social, cultural, political, legal, and technological environment of multinational business, emphasizing host-government/multinational corporation interface. Terminology, trade uses and practices, conditions essential for successful business operations, including export and import procedures, documentation, and legal requirements. physical movement of goods in international business. (Fall and spring)

176 **International Business Theory and Policy** (3) Eldridge

Theoretical relationships underlying international business transactions, governmental and corporate policy, significant trends and their causes. (Spring)

178 **International Business Policy and Operations** (3) Grub, Pieruccini

Integration of functional activities in international and multinational firms, through selected case studies and discussions, to develop and stimulate decision-making from an overall business policy standpoint. Prerequisites: BAd 175 and advanced undergraduate standing. (Fall and spring)

181 **Manufacturing Production** (3) Hullander

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from

various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent. (Fall and spring)

198 **Business Policy and Administration** (3) Loeser, El-Ansary, Eastin
Integration of functional activities in arriving at overall business policy decisions. Prerequisite: BAd 102, 105, 131, 141, 181. (Fall and spring)

199 **Individual Research** (arr.)
Assigned topics. Admission by prior permission of adviser. May be repeated once for credit. (Fall and spring)

Third Group

201 **Social Environment of Business** (3) Timbers
Contemporary social forces acting on business management; business responsibility, ethics. (Fall)

202 **Business-Government Relations** (3) Timbers
Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations. (Fall and spring)

203 **Legal Environment of Business** (3) Timbers
Business under the U.S. Constitution, federal legislation, legal precedents and agency orders. Major emphasis on court decisions relating to business. Prerequisite: BAd 202 or permission of instructor. (Spring)

204 **Legal Aspects of International and Multinational Business** (3) Petersen
Legal environment of international and multinational business including legal systems, antitrust laws, regulation of direct investment, international arbitration and expropriation; topics of current interest. (Fall and spring)

205 **Business Representation and Lobbying** (3) Timbers
Strategies, tactics, and techniques used by business in representing itself to the legislative and executive branches and regulatory agencies of the federal government. Legal and practical constraints. Ethical considerations. (Fall)

208 **Personnel Management and Industrial Relations** (3) Loeser
Survey of personnel management practices and procedures, including labor-management relations. (Fall and spring)

209 **Seminar: Personnel Management** (3) Eastin
Industrial personnel and manpower management, research in advanced problems. (Spring)

210 **The Personnel Manager** (3) Staff
The personnel manager and his or her place in the organization, relation to other executives, policy role and relations with chief executive. Problems of the senior personnel executive. Prerequisite: BAd 208 or permission of instructor.

211 Leadership and Executive Development (3) Loeser

Theories of managerial leadership; issues and problems associated with leadership in large organizations and at higher management levels; executive selection and development. Prerequisite: Mgt 201 or permission of instructor. (Spring)

212 Unionism and Collective Bargaining (3) Burdetsky

The American labor movement. Collective bargaining and the conduct of labor relations under collective bargaining agreements. (Fall)

213 Current Issues in Unionism, Collective Bargaining, and Labor Relations (3) Burdetsky

Current problems and issues. Prerequisite: BAd 212. (Spring)

230 Business Financial Management Handorf, Sachlis

For designated students in the MBA program. Theory, policy, and practice in financial management; financial analysis, sources of funds, investing, capital planning, and budgeting. Prerequisites: Acct 201, Econ 217, Mgt 202 and 216, or equivalents. (Fall and spring)

231 Financial Decision-making (3) Handorf, Sachlis

Theory and practice of business finance with emphasis on special topics within valuation, including capital budgeting, mergers, acquisitions, bankruptcy, and liquidation. Prerequisite: BAd 131 or 230. (Fall and spring)

233 International Business Finance (3) Zwick

Analysis of problems in international business finance. Impact of the evolving international payments system on business. Prerequisite: BAd 131 or equivalent. (Fall and spring)

234 Seminar: Capital Formation (3) Handorf

Determinants of saving and investment and resultant funds flow are evaluated. Special emphasis on the level and risk structure and term structure of interest rates. The role and management of financial institutions is stressed. Prerequisite: BAd 131 or 230. (Fall and spring)

235 Financial Management (3) Sachlis, Handorf, Amling

Cases in financial management: planning financial structure, obtaining and managing capital, issuing and placing securities, administering income, security arrangements. Prerequisite: BAd 231.

236 Seminar: International Banking Zwick

International financial intermediation and international banking. Functioning of international financial markets, public policy issues in international banking, regulation of multicountry banking institutions and the effect of international banks on national monetary policies. Prerequisites: BAd 233, 234. (Fall and spring)

237 Investment Analysis (3) Amling

Risk-reward analysis of security investments including analysis of national economy, industry, company, and market; introduction to portfolio management; emphasis on theory and computer methods. Prerequisite: BAd 131. Laboratory fee, $15. (Fall and spring)

238 Seminar: Investment and Portfolio Management (3) — Sachlis, Amling

Portfolio management theory, application, and computer modeling. Independent research on investment analysis and portfolio management with emphasis on theory, cases, and computer applications. Prerequisite: BAd 237. Laboratory fee, $15. (Spring)

239 Financial Theory (3) — Sachlis

In-depth theoretical analysis of business financial topics, including asset management, financial structure, dividend policy and the capital asset pricing framework. Prerequisite: BAd 231, 237. (Fall and spring)

240 The Marketing Environment — Dyer, El-Ansary, Slagle

For designated students in the MBA program. The environment of marketing. The consumer orientation. Marketing policy and decisions. (Fall and spring)

241 Marketing Management (3) — El-Ansary, Dyer, Divita

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs. (Fall and spring)

243 Seminar: Marketing Research (3) — Dyer

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications. (Spring)

245 Promotion Management/Marketing Communications (3) — Dyer

Examination of promotion mix from a systems perspective supported by analytical methods and concepts regarding consumer attitudes and behavior. Topics: social context of promotion, role of communication in marketing, behavioral concepts and communications research, message design, economic and financial criteria, development of a promotion program. Prerequisite: BAd 241 or permission of instructor. (Spring)

246 Buyer Behavior (3) — Dyer

Examination of theory and recent research concerning buyer decision processes. Interdisciplinary behavioral science studies on individual, family, and organizational purchase behavior are treated. Present and potential applications for marketing in the public and private sector are illustrated with cases. Prerequisite: BAd 241 or permission of instructor. (Fall)

247 Marketing and Public Policy (3) — Divita

Examination of principal areas of public policy formulation affecting marketing practice. Topics: advertising, warranties, product safety, health issues, consumer information systems, informal and formal redress mechanisms, business responsibilities. Government business and advocate viewpoints presented. Prerequisite: BAd 241, 245, or 246; or permission of instructor. (Fall)

248 International Marketing (3) — Lauter, Keegan, El-Ansary

Identifying and assessing international marketing opportunities in a dynamic world environment; developing multinational marketing strategy; multinational marketing product, pricing, channels, and

communication programs management; planning, organizing, controlling, and decision-making emphasized. (Fall and spring)

249 Marketing Strategy (3) Divita

Analysis of complex marketing problems involving policy and operational decisions; emphasis on creative marketing strategy. Prerequisite: BAd 241, 245, and 246; or permission of instructor. (Spring)

250 Marketing to the Government (3) Divita

Overview of government R&D and systems markets. Government acquisition process, buyer behavior, market research, technological planning and the bid decision, field sales force management, proposals, market strategy, pricing strategy, product-line strategy. (Fall)

253 Distribution Logistics (3) El-Ansary

Problems of physical distribution and supply of goods. Role of logistics in the economy and the business firm, transportation rates and services, location theory and problems, service standards, inventory control, information flow, scheduling, allocation, warehousing, traffic and logistics system organization. (Fall)

255 Multinational Corporations in the World Economy (3) Zwick, Grub

Business in the world economy; multinational corporations as economic, political, and social institutions; ownership and growth strategies, relationships to other nations; national and international controls; future of the multinational corporation. (Fall and spring)

256 Seminar: International Trade (3) Eldridge

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues. (Fall and spring)

257 Business Policy in the Multinational Firm (3) Grub, Katz

Integration of functional activities of multinational enterprises from an overall policy position, with emphasis on both domestic and international operations of the firm; problem-solving and decision-making in multinational companies; developing executives for international business. Prerequisite: advanced Master's standing. (Fall and spring)

261 Applied Microeconomics (3) Eldridge

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111; or equivalent; or permission of instructor. (Spring)

262 Applied Macroeconomics (3) Black

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111; or equivalent; or permission of instructor. (Fall)

279 Purchasing and Materials Management (3) Page

Industrial purchasing and materials management principles and pro-

tices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics. (Fall)

280 **Procurement and Contracting** (3) Sherman

Principles and concepts essential to effecting large procurement programs. Planning, sourcing, and contractual design for diverse acquisitions. Emphasis on federal government policy with comparison of buying at other governmental levels and the private sector. (Fall and spring)

282 **Government Contract Administration** (3) Sherman

Surveillance and management of contract performance. Measurement of progress; specification interpretation; quality assurance; changes, negotiation, and adjustment; financial considerations; property; terminations; regulatory and policy concerns. Prerequisite: BAd 280 or permission of instructor. (Fall)

283 **Pricing and Negotiation** (3) Sherman

Scope and objectives of negotiated procurement; preparation, conduct, and recording of negotiations; analysis of cost, price, profit, investment, and risk; cost principles; incentives; relationship of contract type to work requirements; techniques of negotiation. Prerequisite: BAd 280 or permission of instructor. (Spring)

285 **Systems Procurement and Project Management** (3) Sherman

Major systems acquisition: needs, objectives, and organizational relationships. Design, establishment, and execution of project management plans and procurement processes. Developing adequate intercontractual business relationships within the environment of public procurement. Management of projects under contract. (Spring)

290 **Special Topics in Business Administration** (3) Staff

Experimental offering; new course topics and teaching methods. May be repeated once for credit.

295 **Research Methods** (3) Black

Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings. (Fall and spring)

296 **Business Decision Simulation** (3) Staff

Managerial decision-making in a diversified firm in a simulated competitive environment in which a complex situation is played out using computers. Prerequisite: advanced master's or doctoral degree standing.

297 **Business Policy Formulation** (3) Loeser, Keegan

Analysis of operational situations and policy issues. Developing and implementing solutions to managerial problems. Prerequisite: advanced master's degree standing. (Fall and spring)

298 **Directed Readings and Research in Business Administration** (3) Staff

Supervised readings or research in selected fields within business administration. Admission by prior permission of instructor. May be repeated once for credit. (Fall and spring)

299 **Thesis Seminar** (3) Staff
Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) Staff
(Fall and spring)

Fourth Group

Fourth group courses are limited to doctoral students. They are offered as the demand requires.

302 **Seminar: Government-Business Relations** (3) Timbers
Major current issues affecting government-business relations. Research and discussion on selected issues. Prerequisite: BAd 201, 202, 203; or permission of instructor.

311–12 **Seminar: Public-Private Sector Institutions and Relationships** (3–3)

331 **Seminar: Financial Markets** (3) Amling, Handorf, Sachlis
Research seminar in corporate financial theory, investment portfolio theory, and capital market theory. (May be repeated once for credit.) Prerequisite: BAd 232, 234, 238.

341 **Seminar: Marketing** (3) El-Ansary, Dyer
Examination of major theoretical developments in marketing. Topics include advances in research methods, models and data analysis. Emphasis on emerging concepts in consumer behavior, channels, marketing communication and marketing information systems.

358 **Colloquium on International Business** (3) Grub, Keegan, Zwick
Examination of selected topics in international business, with emphasis on major new theoretical and empirical developments. (Fall)

359 **Colloquium on Comparative Management** (3) Lauer
Comparative analysis of management systems under different economic, social, and political conditions. Generic characteristics of management and how modified in different environments. Examination of selected literature.

365 **Seminar: Applied Economics** (3) Black
Primarily for doctoral students. Special topics and applications of analytical tools to business decision-making and policy. Prerequisite: BAd 261, 262; or permission of instructor.

381 **Seminar: Materials and Operations Management** (3) Staff
Recent developments in manufacturing production and materials management; impact of technological, economic and social change; significant related trends. Private and public sector policy implications. New and emerging analysis techniques. Prerequisite: BAd 264, 279, 280, or equivalent; or permission of instructor.

391 **Seminar: Business Management** Burdetsky, Eastin
(Formerly BAd 291)
Examination of major current issues, both theoretical and empirical, affecting the development of the business enterprise. Topics to be announced. Emphasis on policy and strategic issues affecting the total enterprise.

398 **Advanced Reading and Research** (arr.) Lauter
Limited to students preparing for the Doctor of Business Administration general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) Lauter
Limited to Doctor of Business Administration candidates. May be repeated for credit.

CHEMISTRY

Professors R.C. Vincent, R.E. Wood *(Chairman)*, T.P. Perros, W.E. Schmidt, D.G. White, J.B. Levy, N. Filipescu, A.D. Britt, E.A. Caress
Associate Professors D.A. Rowley, M. King
Assistant Professor D. Ramaker

Bachelor of Arts or *Bachelor of Science with a major in Chemistry (Departmental)*—The department offers two undergraduate majors designed to give students broad training in the basic divisions of chemistry: analytical, inorganic, organic, and physical. *Major I* provides considerable concentration in chemistry. However, it permits a wider selection of electives and thus should meet the needs of students preparing to enter medicine, dentistry, or related fields. *Major II* is intended primarily for students preparing for graduate study in chemistry or those planning to enter the chemical profession and wishing to be certified to the American Chemical Society as having met the minimum requirements for professional training. Two foreign languages are recommended for students planning to do graduate work in chemistry.

The following requirements must be fulfilled:

1. Students in either Major I or Major II must meet the general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the humanities and social studies.)

2. Prerequisite courses for Major I and Major II—Chem 11–12 and 22, or 15–16; Math 30, 31; Phys 1, 2.

3. (a) Required courses for Major I—BiSc 11–12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111 12, 113–14, 122, 134, 141, 151–52, 153–54.

(b) Required courses for Major II—BiSc 11 12 or Geol 21–22 (required of Bachelor of Science degree candidates only); Chem 111 12, 113 14, 122, 141 42, 151 52, 153 54, 235; Math 32; one course selected from Chem 195, 207, 213, 221, 222, 251; Math 111, 139; Phys 161, 165, 175; Stat 197.

Twelve semester hours in French, German, Greek, Hebrew, Italian, Latin, Russian, or Spanish (students in Major II should elect German) are recommended for students in both Major I and Major II.

For graduation with Special Honors in chemistry, application must be made at the beginning of the senior year. Registration in Chem 195 is required at that time.

Master of Science in the field of Chemistry—Prerequisite: a bachelor's degree with a major in chemistry from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. The required 30 semester hours of graduate work must include Chem 213 and 221, and at least two of the following: Chem 207, 236, and 251. The thesis requirement, Chem 299–300, may be in analytical, inorganic, organic, or physical chemistry. Chem 156, or its equivalent, is prerequisite to research work in the field of organic chemistry. A reading knowledge examination in German or Russian must be passed, or pro-

ficiency in computer programming must be demonstrated. A student who intends to become a doctoral candidate is strongly urged to take Chem 207 as early as possible in the master's program.

Master of Science in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology)—Prerequisite: a bachelor's degree with a major in chemistry or in geology from this University, or an equivalent degree.

Required: the general requirements, pages 90–98, including Chem 111–12, 213, and 299–300, and Geol 141, 241, and 249. The Master's Comprehensive Examination must be taken before registration for the second half of the thesis work. A reading knowledge examination in a foreign language, approved by the Department of Chemistry or Geology must be passed prior to beginning the third semester of graduate work or before beginning the thesis work, whichever occurs first.

Doctor of Philosophy in the field of Chemistry—Required: the general requirements, pages 90–92, 98–100. Chem 207, 213, 221, 235, 251, and 350 are normally required of the doctoral student, in addition to other courses as determined by consultation with the departmental program committee. A reading knowledge examination in German or Russian must be passed, and proficiency in computer programming must be demonstrated. Cumulative examinations replace the General Examination requirement.

Research fields: analytical chemistry, inorganic chemistry, organic chemistry, physical chemistry (electrochemistry, kinetics, magnetic resonance, theoretical), physical organic chemistry (reaction mechanisms), and structure and synthesis of natural products.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental degree offered by the departments of Chemistry and Geology)—Required: the general requirements, pages 90–92, 98–100, including a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 91; and the satisfactory completion of the General Examinations in four fields, including chemistry and geochemistry.

Bachelor of Arts in Education with a teaching field in Chemistry—Prerequisite: the education curriculum, pages 113–14.

Required: the chemistry option and professional courses on page 117.

Graduate Placement Examinations: All entering students in the master's and doctoral programs in the field of chemistry are required to take the American Chemical Society Graduate Level Placement Examinations, given by the department of chemistry, prior to registration in the Graduate School of Arts and Sciences. The four placement examinations (in the disciplines of analytical, organic, inorganic, and physical chemistry) are of the multiple-choice type. These tests are designed to cover the subject matter in the disciplines generally taught in modern undergraduate programs preparatory for graduate work in chemistry, and the results are used by the department to advise the individual student in planning a program of courses appropriate to the student's background.

Registration: Before completing registration each student must obtain from the representative of the department an assignment to lecture, recitation and laboratory sections. The work of the junior and senior years must be approved by the department.

All graduate students are required to participate in the seminar and colloquium programs.





PHYSICAL SCIENCE

First Group

3–4 Contemporary Science for Nonscience Majors (3–3) Filipescu

Lecture (2 hours), laboratory (3 hours). Contemporary topics in physical, biological and medical science. Chem 3 is not prerequisite to Chem 4 but both courses must be satisfactorily completed to fulfill the meaningful initiation requirement. Laboratory fee, $20 per semester. (Academic year)

CHEMISTRY

First Group

11–12 General Chemistry (4–4) Perros

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 per semester. (Chem 11 and 12—fall and spring)

13 General Chemistry (4) Britt

For engineering and applied science students only. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical bonding; chemical equations; acids and bases; chemical equilibrium; liquid and solid states; periodicity; electrochemistry; organic chemistry. Prerequisite: Math 31, Phys 14 or 15. Laboratory fee, $28. (Fall)

15–16 Intensive General and Analytical Chemistry (4–4) Britt

(Honors Course)

Chem 15: Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Chem 16: Lecture (2 hours), laboratory (6 hours), recitation (1 hour). Equivalent to Chem 11–12 and 22, but with selected topics studied in depth. Prerequisite to Chem 15: high school physics and chemistry. Prerequisite to Chem 16: Chem 15. Admission by placement test prior to registration or on basis of College Board Advanced Placement Examination. Laboratory fee, $28 per semester. (Academic year)

22 Introductory Quantitative Analysis (4) Vincent

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $28. (Fall and spring)

50 Introduction to Organic Chemistry (4) Caress

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. This course does not fulfill the organic chemistry requirement for chemistry majors or premedical students. Prerequisite: Chem 12 or 16. Laboratory fee, $28. (Spring)

Second Group

110 Introduction to Physical Chemistry (3) Wood

Topics include chemical thermodynamics, chemical kinetics, electro-

chemistry, solution chemistry, membrane and phase equilibria, and others. Prerequisite: Chem 16 or 22, Math 31, Phys 2; or permission of instructor. Not open to chemistry majors. May not be taken for credit by students who have received credit for Chem 111–12 or an equivalent course. (Summer)

111–12 Physical Chemistry (3–3) Wood, Ramaker

Gas laws, chemical thermodynamics, chemical equilibrium, kinetics, quantum chemistry, atomic and molecular spectra, structure of solids, liquids, and macromolecules. Prerequisite to Chem 111: Chem 16 or 22; Math 31; Phys 2. Prerequisite to Chem 112: Chem 111. (Academic year)

113 Physical Chemistry Laboratory (2) Schmidt, Wood

Laboratory complement to Chem 111. Prerequisite or concurrent registration: Chem 111. Laboratory fee, $28. (Fall)

114 Instrumental Analysis Laboratory (2) Schmidt, Ramaker

Laboratory complement to Chem 112 and 122. Prerequisite or concurrent registration: Chem 112, 113, and 122. Laboratory fee, $28. (Spring)

122 Instrumental Analysis Lectures (2) Schmidt

Theory of instrumental methods in qualitative and quantitative analysis, determination of structure, and study of reaction mechanisms with emphasis on electroanalysis, spectrophotometry, and chromatography. Correlated with Chem 114. Prerequisite or concurrent registration: Chem 112. (Spring)

134 Descriptive Inorganic Chemistry (2) Perros

Intermediate-level course emphasizing the descriptive chemistry of the elements. Prerequisite: Chem 16 or 22, 152. Prerequisite or concurrent registration: Chem 111. (Fall)

141–42 Advanced Experimental Chemistry (2–2) White, Caress

Designed to provide the chemistry major with facility in experimental methods common to all disciplines of chemistry. Prerequisite: Chem 154. Prerequisite or concurrent registration: Chem 111. Laboratory fee, $28 a semester. (Academic year)

151–52 Organic Chemistry (3–3) Levy, King

Chemistry of the compounds of carbon. Prerequisite to Chem 151: Chem 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 Organic Chemistry Laboratory (1–1) Staff

Laboratory complement of Chem 151–52. Prerequisite or concurrent registration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Laboratory fee, $28 a semester. (Academic year)

156 Qualitative Organic Analysis (3) King

Lecture (1 hour), laboratory (6 hours). Identification of pure organic compounds, separation of mixtures, and identification of their components. Required of all students planning research work in organic chemistry. Prerequisite: Chem 16 or 22, 154. Laboratory fee, $28. (Spring, even years)

191 **History of Chemistry** (2) — Perros

Historical development of chemistry from antiquity to the 20th century. Prerequisite: Chem 12 or 16. (Fall, odd years)

195 **Undergraduate Research** (1 or 2) — Staff

Research on problems approved by the staff. May be repeated once for credit. Laboratory fee, $14 a semester hour. (Fall and spring)

Third Group

207 **Chemical Bonding** (3) — Ramaker

Quantum mechanics, approximate methods, electron spin, Pauli principle, atomic and molecular structure. Prerequisite: Chem 112. (Fall)

211–12 **Physical Chemistry** (2–1) — Wood, Ramaker

Same as Chem 111–12. Admission only by departmental permission. Credit assigned upon satisfactory completion of Chem 213. (Academic year)

213 **Chemical Thermodynamics** (3) — Wood

Application of thermodynamics to chemical problems. Thermochemistry, homogeneous and heterogeneous equilibria, statistical calculation of thermodynamic properties, electrochemistry. Prerequisite: Chem 112 or 212. (Spring)

216 **Statistical Mechanics** (3) — Ramaker

Introduction to classical and quantum statistics designed to acquaint students with basic principles and methods. Prerequisite or concurrent registration: Chem 207 or permission of instructor. (Offered as the demand requires)

218 **Molecular Spectroscopy** (3) — Ramaker

Applications of quantum chemistry, molecular orbital theory, valence bond theory, vibration and rotation of molecules, IR and electronic spectroscopy. Prerequisite: Chem 207. (Spring, even years)

221 **Advanced Analytical Chemistry I** (3) — Britt

Theory and application of recent spectrometric methods of analysis, including electrical, magnetic, and optical instrumentation. Prerequisite: Chem 122. (Fall)

222 **Advanced Analytical Chemistry II** (2 or 3) — Schmidt

Lecture (2 hours), laboratory (3 hours—optional). Theory and application of electroanalysis and separations by physiochemical methods. Prerequisite: Chem 122. Laboratory fee, $14. (Spring, even years)

233 **Organometallic Chemistry** (3) — White

Survey of organometallic compounds with emphasis on the compounds of lithium, boron, aluminum, silicon, the transition metals, and the catalytic role of certain organotransition metal complexes. Prerequisite: Chem 235 and 251, or permission of instructor. (Spring, even years)

235–36 **Advanced Inorganic Chemistry** (3–3) Rowley

Application of modern chemical theories to inorganic substances and reactions followed by a detailed study, developed from the periodic table, of the chemistry of the more common elements. Prerequisite to Chem 235: Chem 112, 152. Prerequisite to Chem 236: Chem 235. (Academic year)

251–52 **Advanced Organic Chemistry** (3–3) Filipescu

Synthesis, reactions, and properties of organic compounds; fundamental theories of organic chemistry, emphasis on reaction mechanisms. Prerequisite to Chem 251: Chem 112, 152. Prerequisite to Chem 252: Chem 251. (Academic year)

257 **Physical-Organic Chemistry** (3) Levy

The transition state theory of chemical kinetics, applications to reaction mechanisms; kinetic isotope effects, linear-free energy relationships, concentrated and "super" acids, Woodward-Hoffman rules, free radical reactions. Prerequisite: Chem 252 or permission of instructor. (Fall, odd years)

258 **Synthesis and Structure Determination in Organic Chemistry** (3) Caress

Methods of structure determination and synthesis of complex organic molecules. Prerequisite: Chem 251 or permission of instructor. (Fall, even years)

295 **Research** (arr.) Staff

Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit not to exceed a total of 8 semester hours. Laboratory fee, $14 a semester hour. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

Laboratory fee, $28 per semester. (Fall and spring)

Fourth Group

350 **Choice and Design of a Research Problem** (1) Staff

Development in written form of an original research plan, fully referenced, and its oral defense. If a grade of C is received, the student must repeat this course for credit and must develop a new research plan. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy cumulative examinations. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

CHINESE

See East Asian Languages and Literatures.

CLASSICS

Associate Professor J.E. Ziolkowski *(Chairman)*
Associate Professorial Lecturer M.E. Norton
Assistant Professorial Lecturer M. Pinkasovic

Bachelor of Arts with a major in Classical Humanities (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Clas 1–2, 3, 4; or equivalent; or Clas 11–12, 13–14; or equivalent; or Clas 15–16, 17–18; or equivalent; or Clas 21–22, 23–24; or equivalent; and Clas 64, 71, 72.
3. Required courses in the major—(a) 12 semester hours selected from second-group classics courses; (b) 18 semester hours selected from Art 101, 102, 103, 111; Hist 105, 108, 109, 110, 111; Phil 111; PSc 117.

Bachelor of Arts with a major in Classical Archeology and Classics (departmental)—An interdepartmental major arranged in conjunction with the Department of Art. The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the natural and mathematical sciences.)
2. Prerequisite courses—Clas 1–2, 3, 4; or Clas 11–12, 13–14.
3. Required courses in the major—Art 101, 102, 103, 111; Hist 109, 110; 15 semester hours in second-group courses in Greek or Latin, including Clas 138. (A reading knowledge of French and German is recommended.)

Master of Arts in the field of Classical Archeology, Classics, and History (an interdepartmental degree program offered by the Departments of Art, Classics, and History)—Prerequisite: a bachelor's degree with a background in classical archeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–98. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate advisor from the departments of art, classics and history; plus a thesis (equivalent to six additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

LATIN AND GREEK

First Group

1–2 Beginning Latin (3–3) — **Ziolkowski**

Grammatical essentials of the language, appropriate reading selections, development of English derivatives, introduction to Roman life and literature. (Academic year)

3 Intermediate Latin: Prose and Poetry (3) — Norton

Development of ability to read and understand Latin literature of moderate difficulty. Prerequisite: Clas 1–2 or equivalent. (Fall)

4 Vergil's Aeneid (3) **Norton**
Significant passages of Vergil's famous epic—in Latin; reading and discussion of the entire poem in translation. Prerequisite: Clas 3 or permission of instructor. (Spring)

11–12 Beginning Greek: Classical (3–3) **Staff**
Study of the grammar, vocabulary, and structure of Greek. Reading of selected classical authors. (Academic year)

13–14 Intermediate Greek: Classical (3–3) **Staff**
Review of grammar; extensive reading of prose and poetry: e.g. Homer, Herodotus, or a play. (Academic year)

15–16 Beginning Greek: Modern (3–3) **Staff**
Study of Modern Greek with conversation, composition, and reading of selected passages from contemporary Greek authors. (Academic year)

17–18 Intermediate Greek: Modern (3–3) **Staff**
Review of grammar, conversation; extensive reading. (Academic year)

Second Group

109–10 Major Latin Authors (3–3) **Ziolkowski**
Selections from one or two major authors will be read each semester. May be repeated for credit. Prerequisite: Clas 3–4 or permission of instructor. (Academic year)

131–32 Latin Prose Composition (1–1) **Ziolkowski**
Exercises in Latin prose composition for all students who have had at least one year of college Latin.

134 Medieval Latin (3) **Andrews**
Selections from the Vulgate and representative Latin writers through the 11th century. Prerequisite: Clas 3, 4; or permission of instructor. May be taken for graduate credit with approval of instructor. (Spring)

139–40 Major Greek Authors (3–3) **Staff**
Selections from a wide variety of Greek prose, drama, and poetry, suited to the needs of the class. May be repeated for credit with permission of instructor. Prerequisite: Clas 14. (Academic year)

141–42 Greek Prose Composition (1–1) **Staff**
Exercise in Greek prose composition. Prerequisite: Clas 12 and permission of instructor. (Academic year)

185–86 Directed Reading (1, 2, or 3) **Staff**
Reading of material in the student's field of interest. Admission by permission of instructor.

Third Group

201 Greek Epigraphy (3) Staff
Readings in Greek epigraphical texts. May be repeated for credit with permission of instructor. Prerequisite: at least two years of college Greek. (Fall)

COURSES IN ENGLISH TRANSLATION

First Group

64 Greek and Latin Origins of English Words (3) Staff
Study of Greek and Latin elements in English to improve vocabulary and facilitate understanding of the language of science, philosophy, politics, etc.

71 Greek Civilization (3) Staff
Study of ancient Greek civilization with focus on public and private life as seen primarily through literature. (Fall)

72 Roman Civilization (3) Staff
Study of Roman civilization with focus on public and private life as seen primarily through literature. (Spring)

Second Group

105 Special Topics in Classical Literature (3) Staff
Focus on a selected topic, such as death in classical antiquity or the hero, or on study of a genre, such as satire or oratory.

108 Classical Mythology (3) Norton
Mythology of the Greeks and Romans from the creation of the world: tales of the gods, heroes, and great families that have influenced literature, art, and music. (Fall)

113 Greek and Roman Drama (3) Staff
Selected masterpieces of Greek and Roman tragedy and comedy. (Spring)

127 Classical Influence on Western Civilization (3) Ziolkowski
A survey of Greek and Roman influence on Western civilization relevant to modern America: literature, art, law, science, philosophy, etc. (Fall)

138 Seminar: Classical Studies (3) Staff
Survey of the broad range of sources and resources involved in pursuing classical studies: standard references, periodicals, library holdings, papyrology, textual criticism, history of classical scholarship.

170 Women in Classical Antiquity (3) Norton
In-depth study and discussion of readings from ancient and modern sources on the role of women in Greek and Roman society.

HEBREW

First Group

21–22 Beginning Hebrew (3–3) **Staff**
Grammatical essentials of the language; readings selected from classical and modern texts; basic audio-lingual drills for comprehension and expression. Laboratory fee, $17.50 a semester. (Academic year)

23–24 Intermediate Hebrew (3–3) **Staff**
Intensive readings and text analysis, with opportunities to develop basic skills. Materials range from Israeli newspapers and scholarly journals to liturgical poetry and rabbinic narratives. Laboratory fee, $17.50 a semester. (Academic year)

103 Modern Hebrew Nonfiction (3) **Staff**
Directed readings in humanities and social sciences. Development of linguistic skills necessary for independent research. (Fall)

104 Modern Hebrew Fiction (3) **Staff**
Study of selected modern Israeli short stories and poems. (Spring)

COLUMBIAN COLLEGE PROGRAM FOR NEW COURSES IN GENERAL AND INTERDISCIPLINARY STUDIES

Committee on Programs: W. M. Reynolds (Chairman)
Two sets of course numbers have been designated to identify new courses sponsored by this program:
701 (General Studies)
721 (Interdisciplinary Studies)
In each case, the course title will be completed by a brief description of the topic of the individual course. Because the courses will be changing constantly, interested students should consult the *Schedule of Classes* for the current semester. The courses will be listed with the other offerings of participating departments.
The 701 number will be used to designate courses taught by individual faculty members. They will explore topics not normally included in departmental offerings, and will utilize insights and methods from disciplines in addition to those usually identified with the sponsoring department. The 721 number will designate upper-level courses in which faculty from two or more departments investigate a topic of mutual academic interest.

CRIMINAL JUSTICE

See **Forensic Sciences.**

DRAMA

See **Speech and Drama.**

EAST ASIAN LANGUAGES AND LITERATURES

Professor C.W. Shih *(Chairman)*
Associate Professorial Lecturer T. Lawton
Assistant Professors G.C.Y. Wang, D.L. Lee
Lecturers M. Wang, W.P. Lyle

Bachelor of Arts with a major in Chinese Language and Literature—The requirements are as follows:

1. The general requirements as stated on pages 74–75, 77, 80–87, and 171–72. (Sixty semester hours from Columbian College, or the equivalent from another accredited institution are required.)
2. Prerequisite courses—Chin 5–6 (preferred); or Chin 1–2, 3–4, and 9; or Chin 7–8 and 9.
3. Required for the major:

(a) *Departmental major in the School of Public and International Affairs*—Chin 11–12, 109–10, and 163–64; plus 12 additional semester hours of second-group Chinese literature courses. The student is required to pass a major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (Chin 199–200) assists the student in preparation for the major examination.

(b) *Field-of-Study major in Columbian College of Arts and Sciences*—Completion of Chin 11–12, 109–10, 163–64, and the passing of the major examination at the end of the senior year. The coordinated field of knowledge upon which the student will be examined includes an active command of modern Chinese language and a general knowledge of Chinese literature and culture. A proseminar (Chin 199–200) assists the student in preparation for the major examination.

Bachelor of Arts with a major in East Asian Studies (China or Japan)—See pages 74–75, 78–79, and 171–72.

A Junior Year Abroad Program is available.

Master of Arts in East Asian Studies with a concentration in Chinese Language and Literature. The requirements are as follows:

1. The general requirements as stated on pages 174–78.
2. Prerequisite: 24 semester hours of Chinese language.
3. 12 semester hours of Chinese literature, 6 hours of history, and 6 hours of relevant East Asian courses.
4. 6 semester hours of thesis research.

CHINESE

First Group

***1–2 Beginning Mandarin Chinese, Level I (3–3)** **Staff**

Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 per semester. (Academic year)

*The combination of Chin 1-2, 3-4, and 9, or the combination of Chin 7-8 and 9, is equivalent to Chin 5-6.

*3–4 **Beginning Mandarin Chinese, Level II** (3–3) G. Wan
Classroom (3 hours), laboratory (1 hour). Continuation of gramma and spoken Chinese with more emphasis on the written language an reading. Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite t Chin 4: Chin 3. Laboratory fee, $17.50 per semester. (Academi year)

5–6 **Beginning Intensive Mandarin Chinese, Levels I-II** (8–8) Lee
Intensive beginner's course in fundamentals of grammar and pronun ciation with graded reading and practice in writing. Prerequisite to Chin 6: Chin 5. Laboratory fee, $17.50 per semester. (Academi year)

*7–8 **Beginning Intensive Mandarin Chinese** (6–6) Lee
Intensive beginner's course in fundamentals of grammar and pronun ciation with graded reading and practice in writing. Prerequisite to Chin 8: Chin 7. Laboratory fee, $17.50 per semester.

*9 **Beginning Mandarin Chinese, Level II** (4) Lee
Reading of simple modern expository writings. Analysis of syntactic structure and practice in writing. Prerequisite: Chin 4 or 8. Labora tory fee, $17.50. (Fall or spring)

10 **Chinese Calligraphy** (1) M. Wan
Design and writing of Chinese characters with traditional writing implements. No knowledge of the language required. May be repeate for credit.

11–12 **Intermediate Intensive Mandarin Chinese** (6–6) G. Wall
Reading of basic texts, writing of short pieces, conversation, sys tematic review of grammar. Prerequisite to Chin 11: Chin 8 or 9 Prerequisite to Chin 12: Chin 11. Laboratory fee, $17.50 per semester (Academic year)

13–14 **Reading Chinese for Beginners** (4–4) Staff
Basic grammar and syntax of modern Chinese; development of read ing ability in beginners' textbooks and newspapers. Primarily for graduate students who wish to acquire a reading knowledge without learning to speak or write the language. (Academic year)

†91 **East Asia—Past and Present** (3) Johnson and Associated Faculty
An interdisciplinary course, introducing the student to a compre hensive and integrated understanding of the civilization and presen problems of East Asia. (Spring)

93–94 **East Asian Literature—in Translation** (3–3) Staff
Lecture and discussion. Survey of Chinese and Japanese literature from earliest periods through literary masterpieces of the early 20th century.

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* The combination of Chin 1-2, 3-4, and 9, or the combination of Chin 7-8 and 9, is equivalent to Chin 5-6.
† An interdepartmental course offered by the East Asian Languages and Literatures, Economics, Geography and Regional Science, History, Philosophy, Political Science, and Religion Depart ments.

Second Group

107–8 Readings in Modern Chinese (3–3) Staff
Intensive readings in selected modern literary works, social science materials, and documentary materials. Prerequisite: Chin 12 or equivalent. (Academic year)

109–10 Introduction to Classical Chinese (3–3) Shih
Introduction to classical writing in Chinese literature, history, and philosophy. Prerequisite: Chin 6 or 9. (Academic year)

123–24 Introduction to Chinese Linguistics (3–3) Staff
Introduction to the history of the Chinese language. Analysis of linguistic structure of modern spoken Chinese and classical Chinese. Prerequisite: Chin 6 or equivalent, or a course in linguistics.

161–62 Introduction to Chinese Culture (3–3) Staff
Survey of the Chinese cultural heritage—literature, philosophy, art, religion, and social history—from pre-history to the modern era. Lecture and discussion in English. (Academic year)

163–64 Chinese Literature in Translation (3–3) Staff
Lectures focusing on major works of poetry, drama, and the novel in their historical and social context. An introductory course. (Academic year)

179–80 20th-Century Chinese Literature (3–3) Shih
Short stories of Lu Hsün, Lao She, and others. Informal essays by Lu Hsün, Chou Tso-jen, and Chu Tze-ch'ing. Drama of T'ien Han and Ts'ao Yü. Prerequisite: Chin 107 or equivalent.

185–86 Directed Reading (3–3) Staff
Reading of material in the student's field of interest. Admission by permission of instructor. (Academic year)

199–200 Proseminar: Readings for the Major in Chinese Language and Literature (3–3) Staff
Conferences and group discussions. (Academic year)

Third Group

271–72 Poetry of the T'ang and Sung Periods (3–3) Staff
Reading of works of leading poets. Discussion of content and style. Prerequisite: Chin 109 or equivalent.

273 Yüan Drama (3) Shih
Readings of plays by Kuan Han-ch'ing, Ma Chih-Yüan, Cheng Kuang-tsu, Po P'u, and Wang Shih-fu. Prerequisite: Chin 109 or equivalent.

277–78 Prose Narratives of the Sung, Ming, and Ch'ing Periods (3–3) Shih
Short stories of the Sung period. Selected readings of Ming-Ch'ing novels. Historical development and stylistic traits. Prerequisite: Chin 107 or equivalent.

JAPANESE

First Group

1–2 **Beginning Japanese, Level I** (4–4) **Staff**

Lecture (4 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Japn 2: Japn 1. Laboratory fee, $17.50 per semester. (Academic year)

3–4 **Beginning Japanese, Level II** (4–4) **Staff**

Lecture (4 hours), laboratory (1 hour). Continuation of grammar with more emphasis on written language and reading. Prerequisite to Japn 3: Japn 2. Prerequisite to Japn 4: Japn 3. Laboratory fee, $17.50 per semester. (Academic year)

ECONOMICS

Professors J.W. Kendrick, C.T. Stewart, Jr., J. Aschheim, R.P. Sharkey, H. Solomon, S. Levitan, T. Suranyi-Unger, Jr. *(Research)*, C. Hsieh, J.L. Gastwirth, M.A. Holman *(Chairman)*, R.M. Dunn, Jr.
Adjunct Professors T.F. Carroll, J. Grunwald, J.L. Fisher, P. Swamy, P.E. Austin
Professorial Lecturers J. Hardt, E.M. Hadley, O.C. Snellingen
Associate Professors R.Y. Yin, W.F.E. Long, S.E. Haber, R.S. Goldfarb, J.R. Barth, A.M. Yezer
Associate Professorial Lecturers P.A. Musgrove, S.S. Sutton, S.C. Salop, D.G. Tuerck, G.R. Wilensky, J.E. Fredland, R.B. Helms, S.W. Salant, T.R. Robinson, J. Salop
Assistant Professors R. Sines, C.M. Aho, J.J. Cordes, S. Neftci, R.C. Sickles, A.D. Strickland, M.R. Metzger
Assistant Professorial Lecturer I. Kyriakopoulos

Bachelor of Arts with a major in Economics (Departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the humanities and the natural and mathematical sciences.)
2. Prerequisite course—Econ 1–2.
3. Required courses in related areas—Math 41 and 42, or equivalent; Stat 111 and 112, or equivalent; six semester hours of a social science other than economics.
4. Required courses in the major—Econ 101, 102, 121, 198, and 15 additional semester hours of second-group economics courses to be approved by the departmental advisor.

Master of Arts in the field of Economics—Prerequisite: a Bachelor of Arts degree with a major in economics from this University, or an equivalent degree. An understanding of basic calculus is assumed for those entering the Master of Arts program in economics.

Required: the general requirements, pages 90–98, including (1) Econ 203–4, 205, and 275 or 279; (2) 12 additional semester hours to be selected from other third-group economics courses; (3) a Master's Comprehensive Examina-

tion in economic theory; (4) completion of a tool requirement (either the passing of a reading knowledge examination in one foreign language or the satisfactory completion of one of the following courses: Math 124, Stat 97, or Stat 157 58); and (5) either a thesis (Econ 299–300) or 12 semester hours selected from additional third-group economics courses.

Doctor of Philosophy in the field of Economics—**Required: the general requirements**, pages 90–92, 98–100, including (1) Econ 202, 203–4, 205–6, 215–16, 379 or 380, and 24 additional semester hours of approved graduate course work including Econ 275 or 279; (2) passing of the General Examination in microeconomic theory, macroeconomic theory, and two other fields selected by the student and approved by the doctoral program committee; (3) completion of the tool requirement (the passing of a reading knowledge examination in one foreign language plus the satisfactory completion of Math 124, Stat 97, or Stat 157 58; and (4) a dissertation to demonstrate the candidate's ability to do original research in one of the following fields: econometrics development, economic history, economic policy, economic theory, environmental economics, health economics, history of economic thought, industrial organization, international economics, labor economics, mathematical economics, monetary economics, national income accounting, natural resources economics, public finance, regional and urban economics, and Soviet economics.

Departmental prerequisite: Econ 1–2 is prerequisite to all other courses in economics except Econ 217–18.

First Group

1–2 Principles of Economics (3–3) **Hsieh, Long, Dunn**
Lecture (2 hours), discussion (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: macroeconomics; Econ 2: microeconomics. (Econ 1 and 2—fall and spring)

*91 **East Asia—Past and Present** (3) Johnson and Associated Faculty
An interdisciplinary course, introducing the student to a comprehensive and integrated understanding of the civilization and present problems of East Asia.

Second Group

101 **Intermediate Microeconomic Theory** (3) Yin, Metzger, Strickland
Analysis of supply, demand, and pricing. (Fall and spring)

102 **Intermediate Macroeconomic Theory** (3) **Kendrick, Yin**
Theories of national income determination and growth. (Fall and spring)

104 **History of Economic Thought** (3) **Hsieh**
History of the major schools of economic thought, influence of changing problems on the development of economic theory. (Spring)

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* Interdepartmental course offered by the East Asian Languages and Literatures, Economics, Geography and Regional Science, History, Philosophy, Political Science, and Religion Departments.

105 **Economic Conditions Analysis and Forecasting** (3) Kendrick
Theory and empirical analyses of economic trends and fluctuations; use of economic indicators and simple econometric models. (Fall)

121 **Money and Banking** (3) Barth
Nature of money, credit, commercial banking, and other financial institutions in the U.S. monetary system. (Fall and spring)

122 **Monetary Theory and Policy** (3) Aschheim, Barth
Analysis of role of money in economic activity in terms of supply of and demand for loanable funds, interest rates and price level. Problems of U.S. monetary policy. Prerequisite: Econ 121. (Spring)

*123 **Introduction to Econometrics** (3) Sines, Sickles
Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 41; Stat 121. (Spring)

130 **Comparative Economic Systems** (3) Aschheim, Yin
Critical exposition of fundamental economic concepts and theories of capitalism, communism, socialism, and fascism.

133 **Economy of the Soviet Union** (3) Hardt
Development and main features of economic life in the Soviet Union. (Fall)

134 **Comparative Communist Economic Systems** (3) Hardt
Analysis of economic development and performance of the Soviet Union and other Soviet-type economies. Institutional aspects and quantitative measures of performance. (Spring)

136 **Natural Resources and Environmental Economics** (3) Yezer
Analysis of market mechanisms for allocating energy and natural resources; cases of market failure in the use of the environment; policies to improve resource allocation using market and regulatory strategies. (Spring)

142 **Labor Economics** (3) Haber
Analysis of labor supply and demand; poverty and income maintenance; relation between wages, prices and unemployment; occupational choice.

†147 **Economic History of Europe** (3) Sharkey
European economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

‡153 **Poverty in America** (3) Boeckmann, Yezer
Exploration of social and economic causes of poverty in the United States and evaluation of present and proposed anti-poverty strategies, including comprehensive welfare reform. Discussion of conflicts between sociological and economic models of behavior of low income groups.

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* Interdepartmental course offered by the Economics and Statistics Departments.
† Interdepartmental course offered by the Economics and History Departments.
‡ Interdepartmental course offered by the Economics and Sociology Departments.

157 Urban and Regional Economics (3) — Yezer
Analysis of the determinants of urban growth and development; firm location; the functioning of urban land and housing markets.

158 Industrial Organization (3) — Long
Analysis of the structures and production, pricing, and related practices of industries with emphasis on their significance and on appropriate economic policies. (Spring)

160 Social and Economic Indicators (3) — Staff

161 Public Finance I (3) — Cordes
Theoretical and institutional analysis of government expenditures, taxation, and intergovernmental fiscal relations. (Fall)

162 Public Finance II (3) — Cordes
Theoretical and institutional analysis of fiscal policy and debt management. (Spring)

165 Economics of Human Resources (3) — Stewart, Goldfarb
Economic analysis of education and training, health care, and other contemporary problems. (Fall)

169 Introduction to the Economy of Communist China (3) — Yin
Background, organization, and operation of the economy. Appraisal of performance and analysis of problems of development. (Fall)

170 Introduction to the Economy of Japan (3) — Hadley
Analysis of the structure and growth of the Japanese economy. (Spring)

*179–80 **U.S. Economic History** (3–3) — Sharkey
Process of economic growth from Colonial times to the present. Development of various sectors in the economy and their interdependence. Econ 179: 1607-1865. Econ 180: 1865 to present. (Academic year)

181–82 **International Economics** (3–3) — Dunn, Aho
Econ 181: international trade theory and international monetary theory. Econ 182: continuation of international monetary theory; economic development. (Academic year)

185 **Economic History and Problems of Latin America** (3) — Staff
Analysis of present structures and problems of Latin American economies. (Spring)

198 **Proseminar in Economics** (3) — Stewart, Aschheim, Long
Examination of major topics in economic theory and the application of theory and analysis to policy problems. Open only to economics majors in their senior year. (Fall and spring)

199 **Independent Research in Economics** (3) — Staff
Under the personal direction of an instructor. Limited to economics majors with demonstrated capacity. Prior approval of instructor required. (Fall and spring)

*Interdepartmental course offered by the Economics and History Departments.

Third Group

Third-group economics courses (except 217–18) are designed for graduate students in economics or for graduate students with prescribed prerequisites.

202 History of Economic Thought (3) Hsieh

Critical analysis and interpretation of the development of economic theory from Plato through the "Keynesian Revolution" and the "Monetarist Counter-revolution." (Fall and spring)

203–4 Microeconomic Theory (3–3) Goldfarb, Metzger

Econ 203: demand, production. Prerequisite: Econ 101 or equivalent. Econ 204: market structure, income distribution, intertemporal allocation, welfare economics; other topics. Prerequisite: Econ 203. (Econ 203 and 204—fall and spring)

205 Macroeconomic Theory I (3) Hsieh, Barth, Nefti

Theories of income, employment and the price level; aggregate supply and demand; consumption, saving, investment and the multiplier; supply and demand for money; government's and central bank's role in the economy. (Fall and spring)

206 Macroeconomic Theory II (3) Hsieh, Barth

Capital and growth theory. Discussion of Cambridge controversy in the theory of capital and one- and two-sector models of economic growth. Other selected advanced topics in macroeconomics. (Fall and spring)

207 Business Cycle Analysis (3) Kendrick

Empirical analysis of American business cycles; evaluation of the methodology and findings of the National Bureau of Economic Research. (Spring)

208 National Income (3) Kendrick

Theory and measurement of economic aggregates within an integrated national income accounts framework, including balance sheets and wealth statements. (Spring)

210 Economic Methodology (3) Stewart

Methodology of economics, review of selected theoretical issues in economic theory. Prerequisite: six semester hours of graduate courses in economic theory. (Spring)

212 Economics of Property Rights (3) Staff

Application of microeconomic theory to decision-making within business and government organization subject to alternative institutional constraints. Prerequisite: Econ 101. (Spring)

215–16 Mathematical Economics (3–3) Sinai

Formulation and application of mathematical models in economic theory. Prerequisite: a one-year calculus sequence. Open to undergraduates. (Academic year)

217–18 Survey of Economics (3–3) Holman

For graduate students in fields other than economics. Econ 217: price theory. Econ 218: income and employment theory. Departmental prerequisite waived. (Econ 217 and 218—fall and spring)

223–24 **Monetary Theory and Policy** (3–3) Aschheim, Barth
Theory of monetary policy within the framework of contemporary American central banking. (Academic year)

233 **Seminar: Agrarian Reform, Income Distribution and Development** (3) Carroll
Equity and income redistribution issues in the context of current developmental programs, stressing land reforms and recent Latin American experience. (Fall)

234 **Seminar: Rural and Regional Development Projects** (3) Carroll
Design and evaluation of rural-based investment projects, with case studies drawn from experience of international agencies, especially in Latin America. (Spring)

235 **Energy Resources and Policy** (3) Staff
Consideration of economic and related policy issues directed at energy problems. (Fall)

237 **Economics of the Environment and Natural Resources** (3) Holman
Analysis of public policy problems relating to the environment and natural resources development and management. (Spring)

241–42 **Labor Economics** (3–3) Goldfarb
Theory of wages and employment, analysis of labor supply and demand. Structural unemployment; occupational choice; labor market discrimination. (Academic year)

243 **Seminar: Manpower Policy** (3) Levitan
Developments leading to expansion of public investment in manpower resources; evaluation of goals and operations of publicly supported programs. Open to undergraduates. (Fall)

244 **Economics of Education** (3) Austin
Returns to investment in education, allocation of resources to and within education, educational financing.

245–46 **Industrial Organization** (3–3) Long, Strickland
Structure and performance of the American economy; emphasis on the economics of antitrust policy and the impact of government regulatory policies. (Academic year)

247 **Seminar: Industrial Organization** (3) Long
Selected topics in regulatory economics and in antitrust economics during alternate years. Topics for 1978: antitrust problems. Prerequisite: Econ 101 or equivalent. (Spring)

248 **Health Economics** (3) Wilensky
Demand for medical care; organization of the health care delivery industry; policy issues on regulation, efficiency and allocation of health care services.

251 **Economic Development Theories** (3) Staff
Basic theories of economic growth and development. Emphasis on theories inspired by the underdevelopment process. (Fall and spring)

252 Economic Development Issues (3) St
Topics of current importance in underdeveloped countries, such a income distribution, industrial policies, economic integration, agr cultural development, and economic planning. Prerequisite: Econ 25 (Spring)

253 Productivity Analysis (3) Kendric
Concepts, measurement, and analysis of productivity in business an government at aggregate and organizational levels. (Fall)

254 Economics of Advertising and Information (3) Tuerc
Theory and empirical analyses of the role of advertising and informa tion in industry structure and performance. (Fall)

255 Economics of Technological Change (3) Stewar
Economic principles related to determining the proper federal ro in influencing civilian-oriented technological change. (Fall)

257 Regional Economics (3) Yeat
Analysis of firm location, patterns of interregional or intermetropoli tan production, urban and regional growth and patterns of develop ment. (Fall)

258 Urban Economics (3) Yeat
Analysis of spatial relationships among economic activities within an urban area including the urban land, labor, and housing markets urban transportation models; fiscal relationships among jurisdictions. Prerequisite: Econ 257 or permission of instructor. (Spring)

259 Income Distribution (3) Staff
Theoretical and empirical analysis of income distribution, including analysis of policies related to income inequality. Open to advanced undergraduate economics majors. (Fall)

261 Welfare Economics (3) Stewart
Theories of welfare economics and their applications to public policy; analysis of selected topics in public policy. (Fall)

263 Theory of Public Finance I (3) Cordes
Allocation and distribution aspects of government budget policy, in cluding critical analysis of theories and principles of expenditures stabilization, and intergovernmental fiscal relations. (Fall)

264 Theory of Public Finance II (3) Cordes
Analysis of the effects of taxation on resource allocation and income distribution; impact of the public debt. (Spring)

265 Readings in International Taxation (3) Snellinger
Examination of topics in economic theory and policy of international taxation: taxation of foreign currency and multinational corporations tax evasion and tax havens, and tax systems for economic develop ment. (Fall)

267 Seminar: Soviet Economy (3) Hardt
Development of the Soviet-type economy. Organization, policies, and problems: monetary, production, allocative, foreign trade, economic growth. Admission by permission of instructor. (Fall)

268 **Seminar: Economic Theory and Development in Communist Countries** (3) — Hardt

Appraisal of the Soviet model for economic development in the communist world, especially in Eastern Europe and China. Admission by permission of instructor. (Spring)

269 **Economy of Communist China I** (3) — Yin

Analysis of organization, operation, policies, and problems. Development of the economy under communism. (Fall)

270 **Economy of Communist China II** (3) — Yin

Continuation of Econ 269, examining critical problems of development. Prerequisite: Econ 269 or permission of instructor. (Spring)

271 **Economy of Japan** (3) — Hadley

Analysis of Japanese economic institutions and their contribution to Japan's development. (Fall)

*275 **Econometrics I: Introduction** (3) — Sickles, Neftci

Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equation problems. Prerequisite: Stat 157 58 or equivalent, or permission of instructor. Some exposure to matrix algebra is suggested. (Fall)

*276 **Econometrics II: Simultaneous Equation Models** (3) — Sickles

Economic models and simultaneous equation systems. Prerequisite: Econ 275. Recommended: a course in matrix theory. (Spring)

*279 **Methods in Economic Statistics** (3) — Gastwirth, Neftci

Application of statistical methods to economics. Curve-fitting, regression, analysis of variance, and chi-square techniques used to analyze economic data. Prerequisite: a one-year course in statistics. (Fall and spring)

281–82 **International Economics** (3–3) — Dunn, Aho

Econ 281: theory of international trade and factor movements. Econ 282: international finance. (Academic year)

285–86 **Economic Development of Latin America** (3–3) — Grunwald

Econ 285: development models, import substitution, and industrialization; underemployment, inequality, and policies for employment and income redistribution. Econ 286: theory and performance in trade, economic integration, planning for development; foreign aid, foreign investment, technology transfers. (Academic year)

287 **Seminar: Problems in Latin American Civilization** (3) — Staff

Interdisciplinary seminar partially guided by a specialist within the methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

†290 **Principles of Demography** (3) — Staff

Introduction to basic demographic perspectives and data; methods

*An interdepartmental course offered by the Economics and Statistics Departments.
†An interdepartmental course offered by the Departments of Economics, Geography and Regional Science, Sociology, and Statistics.

for analysis of population size, distribution, and composition; d terminants and consequences of population trends. (Fall)

*291 **Methods of Demographic Analysis** (3) Sta
Basic methods for analysis of mortality, natality, and migration; pop lation estimates and projections; estimation of demographic measur from incomplete data. (Spring)

298 **Reading and Research** (3)
Limited to Master's degree candidates. (Fall and spring)

299–300 **Thesis Research** (3–3) Staf
(Fall and spring)

Fourth Group

Fourth-group economics courses are limited to graduate students and a primarily for doctoral candidates. They are offered as the demand requires.

305 **Seminar: Macroeconomics** (3) Staf
Selected topics in macroeconomics. Prerequisite: Econ 205.

312 **Seminar: Price Theory** (3) Staf
Discussion of topics of price theory from recent journal articles.

313 **Seminar: Economic Thought** (3) Haie
Continuation of Econ 202. Principal trends in economic thought

315 **Seminar: Topics in Mathematical Economics** (3) Solomo
Intensive study of selected topics, including economic activity analy sis, risk and uncertainty, and other topics of current interest. Pre requisite: Econ 215–16.

321 **Seminar: Monetary Theory** (3) Aschheim
Recent developments in monetary theory.

341 **Seminar: Labor Economics** (3) Staff
Current problems in theory and policy.

363 **Seminar: Public Finance** (3) Staf
Selected topics of current interest.

†378 **Seminar: Topics in Econometrics** (3) Staf
A research seminar covering current econometric literature and spe cial topics. Admission by permission of instructor.

‡379–80 **Readings in Economic History** (3–3) Sharke
Econ 379: American economic history. Econ 380: modern European economic history. Prerequisite: the appropriate second-group prepa ration and consent of instructor. (Academic year)

390 **Seminar: International Economic Theory** (3) Staf
Limited to graduate students, primarily for doctoral students. Exami nation of recent contributions in this field.

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* An interdepartmental course offered by the Departments of Economics, Geography Regional Science, Sociology, and Statistics.
† An interdepartmental course offered by the Economics and Statistics Departments.
‡ An interdepartmental course offered by the Economics and History Departments.

391 **Seminar: International Economic Policy** (3) **Staff**
Topics selected from current significant policy problems.

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

EDUCATION

Professors M.E. Coleman, D. Sinick, R.E. Baker, M.N. Rashid, R. Tillman, A. Marinaccio, L.H. Elliott, L. Nadler, M. Brenner, J.G. Boswell, C.E. Vontress, R.J. Frankie, S. Kavruck *(Visiting)*, M. McIntyre, D.A. Moore, L. Winkler, D. Linkowski *(Chairman)*
Professorial Lecturers W.W. Chase, A. Drexler, D. Iwamoto
Associate Professors E.P. Kulawiec, G.L. Horrworth, R.I. Peterson, G.D. Wiggs, S.R. Paratore, G.W. Smith, J.W. Fleck, M. Burns, J.C. Heddesheimer, J.A. Greenberg
Assistant Professor G.A. Lofaro *(Research)*
Adjunct Assistant Professor J. Noel
Assistant Professorial Lecturers J.D. Gates, M.R. Phelps, R.E. McNelis, W.N. Davis, T.R. Howie, D.G. Altscher, P. Callas
Instructor M. Gazvoda *(Research)*
Lecturers C.S.J. Gage, M.F. Kelso, C.B. Stapp, S.A.R. Hoth

Programs of study leading to the degrees of *Bachelor of Arts in Education, Master of Arts in Education, Master of Arts in Teaching, Education Specialist,* and *Doctor of Education* are offered by the School of Education and Human Development (see pages 103–32).

Second Group

Educ 136, 137, 138, 139, 140, 144, and 146 are special methods courses which are to be elected in the senior year by students in the secondary school curriculum after substantial preparation in the teaching fields concerned. Course requirements and hours of credit vary with license requirements. Practices of successful teachers studied; actual teaching content as found in current texts and courses of study reviewed. Prerequisite to all special methods courses: Educ 108, 123, and 131. Additional prerequisites are stated under each course.

100 **Special Workshop in Education** (arr.) **Staff**
Topics to be announced in the *Schedule of Classes*. May be repeated for credit. (Fall and spring)

101 **Career Choices in Education and Human Services** (3) Horrworth, Burns
Introduction to the wide variety of careers available in education and allied services: early childhood through college, museum, rehabilita-

tion, industry, publishing, community, recreation, tourism, and government settings. Supervised three-hour visits to selected sites. (Fall and spring)

102 **Introduction to Human Development I** (3) McIntyre
Lectures and three-hour site visits. All aspects of development through the early childhood stage. Field experiences based on variety of child study techniques. (Fall and spring)

103 **Introduction to Human Development II** (3) McIntyre
Lectures and three-hour fieldwork sessions. Development from middle childhood on. Cultural, familial, and societal influences highlighted. Prerequisite: Educ 102. (Fall and spring)

104 **Psychology for Learning and Teaching** (3) Horrworth
Principles, theory, nature, and course of learning and teaching processes. Examination and analysis of the strategies and dynamics of teaching and learning in behavioral settings. Three-hour fieldwork sessions. Prerequisite: Educ 102, 103. (Fall and spring)

105 **Society and the School** (3) Boswell
Historical and social development of education, contemporary issues, cooperation of the school with other community agencies, functions of school personnel. (Fall and spring)

110 **Elementary School Teaching of Reading** (3) Horrworth
Introduction to methods, techniques, materials, and activities essential to a good elementary school reading program. Prerequisite: Educ 108 and 123, or teaching experience.

111 **Elementary School Curriculum and Methods** (15) Moore and Staff
Diagnostic reading, children's literature, mathematics, science, language arts, social studies, music, art, physical education. Pre-student teaching one and one-half days a week. Prerequisite: Educ 102, 103, 104, 105; and senior standing. (Fall)

112 **Educational Measurement** (3) Staff
Basic evaluative measurement techniques: selection, administration, and interpretation of standardized tests; test construction, evaluation procedures, statistical analysis. (Fall and spring)

113 **Elementary School Art** (3) Staff
Lecture and laboratory (3 hours), field work—as arranged. For undergraduates in the elementary school curriculum. Materials and methods. Material fee, $5. (Spring)

115 **Experimental Course** (arr.) Staff
Courses being offered for the first or second time. Topics to be announced in the *Schedule of Classes*. May be repeated for credit. (Fall and spring)

118 **Elementary Reading: Classroom Diagnosis and Instruction** (3) Staff
Emphasis on diagnostic procedure aimed at individualizing and improving classroom instruction. Prerequisite: Educ 110 or equivalent. (Fall and spring)

121 **International Experiences** (1 to 6) Staff

Travel to a foreign country for study of a specific topic. (Fall and spring)

124 **Communication Skills and Interpersonal Relationships** (3) Brenner

Theory and practice in the development of professional relationships: teacher-child, teacher-parent, teacher-supervisor, utilizing interview and other activities.

125 **Museums in Washington** (3) Hoth

Introduction to use of museum collections and services. Museum visits will include unusual collections in art, history, and natural science.

128 **Children's Literature** (3) McIntyre

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development. (Fall)

131 **Secondary School Principles and Methods** (3) Boswell, Kulawiec

For seniors. Classroom management and teaching techniques for initiating, guiding, and evaluating learning activities. Group-work to be arranged. Prerequisite: Educ 104 and 105. (Fall)

132 **Student Teaching in Early Childhood Schools** (6 to 9) McIntyre

For seniors. Admission by permission of instructor. Prerequisite: Educ 111 or equivalent; Educ 150, 152, 153. (Fall and spring)

133 **Supervised Experience in Education** (3 to 6) Staff

Field work, internship, and instructional practice: (1) adult education and human resource development (Wiggs); (2) college student development experience (Burns); (3) higher education (Frankie); (4) museum education (Brenner); (5) counseling (Heddesheimer). Admission by permission of instructor. (Fall and spring)

134 **Student Teaching in Secondary Schools** (6 to 9) Boswell, Kulawiec, and Staff

For seniors. Admission by permission of instructor. Prerequisite: Educ 131. (Fall and spring)

135 **Student Teaching in Elementary Schools** (6 to 9) Horrworth, Moore, and Staff

For seniors. Admission by permission of instructor. Prerequisite: Educ 111 or equivalent. (Fall and spring)

136 **Teaching English in Secondary Schools** (3) McNelis

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in English. (Spring)

137 **Teaching Speech** (3) Staff

Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours in speech or permission of instructor. (Spring)

138 **Teaching Social Studies in Secondary Schools** (3) Boswell

Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of social studies. (Spring)

139 **Teaching Art in Secondary Schools** (3) Staff
Lecture (2 hours), laboratory (2 hours). Prerequisite: 24 semester hours of Art. Material fee, $5. (Spring)

140 **Teaching Mathematics in Secondary Schools** (3) Gates
Lecture (2 hours), field work (2 hours). Prerequisite: mathematics through calculus. (Spring)

144 **Teaching Science in Secondary Schools** (3) Kulawiec
Lecture (2 hours), field work (2 hours). Prerequisite: 24 semester hours of science. (Spring)

146 **Teaching Foreign Languages** (3) Kulawiec
Lecture (2 hours), field work (2 hours). Prerequisite: 18 semester hours of one foreign language. (Spring)

150 **Foundations of Early Childhood Education** (3) McIntyre
Historical developments, philosophy, and objectives of nursery schools, kindergartens, and day care centers; exploration of contemporary programs and models with curriculum implications for schools in the U.S. and abroad. Admission by permission of instructor. (Fall)

152 **Early Childhood Curriculum** (3) McIntyre
Writing, content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and aesthetic education. Admission by permission of instructor. (Fall)

153 **Role of the Professional in Early Childhood Education** (3) McIntyre
Planning, reporting, records, teacher-child and teacher-family interaction, diagnosis and evaluation, working with paraprofessionals. Admission by permission of instructor. (Spring)

154 **Community Resources and Materials for the Young Child** (3) McIntyre
Interaction with community agencies for services and resources; physical facilities, including play activities and curriculum materials for the young child. Admission by permission of instructor. (Spring)

161 **Human Development** (3) Rashid
Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research. (Fall and spring)

162 **Foundations of Counseling** (3) Heddesheimer, Winkler
Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. (Fall and spring)

163 **Personal and Social Adjustment** (3) Winkler
Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall and spring)

171–72 **Seminar: International Education** (3–3) Moore
Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized.

173 **Comparative Education** (3) Kulawiec
A systematic investigation of the educational structure and practices of selected representative school systems throughout the world. Emphasis on development of a methodology for comparative study.

178 **Designing and Implementing Conferences and Meetings** (3) Nadler
Same as HKLS 178. Use of design committees, steering committees, selection of resource people, site selection, exhibits, and relation to supplier personnel. Special attention to designing the core of the conference, and related conference activities. (Summer)

Third Group

Departmental prerequisite: A degree from an accredited institution is prerequisite to all third-group courses in education. Adequate professional preparation is prerequisite to all third-group courses in education except for those courses limited to students in the M.A.T. degree program. Undergraduate students in their senior year may enroll in third-group courses with permission from the instructor.

200 **Special Workshop in Education** (arr.)
Topics to be announced in *Schedule of Classes*. May be repeated for credit.

201–2 **International Education** (3–3) Moore
Survey of selected foreign educational systems and cultures. Research, techniques, and materials to develop world-mindedness. Embassy resources utilized.

203–4 **Comparative Education** (3–3) Kulawiec
A systematic investigation of the educational structure and practices of selected representative school systems throughout the world. Emphasis on development of a methodology for comparative study.

205 **The Curriculum** (3) Staff
For experienced teachers. Curriculum foundations and issues, comparison of curriculum patterns, curriculum development in subject areas, and group consideration of student problems.

207 **Curriculum Materials** (3 to 6) Staff
For experienced teachers. Construction of courses of study and classroom teaching aids, with direct application to students' situations.

208 **Human Development** (3) Rashid
Consideration of human development and behavior throughout the life span; emphasis on practical implications of relevant interdisciplinary research. (Fall and spring)

209 **Child Development** (3) Rashid
Interdisciplinary approach to child development and behavior. Practical implications of research in disciplines contributing to knowledge about childhood. (Fall)

210 Adolescent Development (3) — Rashid

Interdisciplinary approach to adolescent development and behavior. Practical implications of research in disciplines contributing to knowledge about adolescence. (Spring)

212 Quantitative Methods I: Introduction to Survey Measurement and Research (3) — Paratore, Smith, and Staff

Introduction to measurement techniques and evaluation. Emphasis on application and interpretation of data gathering techniques and descriptive statistics.

213–14 History of Education (3–3) — Boswell

Educ 213: Education as a major factor in the development of world civilization from the invention of writing, through the organization of schools, to the contemporary challenge to schools. Educ 214 evolution of the American educational system. (Alternate academic years)

215 Experimental Course (3) — Staff

Courses being offered for the first or second time. Topics to be announced in the *Schedule of Classes*. May be repeated for credit (Fall and spring)

217–18 Philosophy of Education (3–3) — Kulawiec

Educ 217: to help students formulate a personal philosophy of education. Educ 218: social foundations of education—forces that shape policies and offerings of the school. (Academic year)

219 Elementary School Classroom Procedures (3) — Baker

Current theories of teaching and learning and their application to teaching strategies of elementary school teachers. (Spring)

221 International Experiences (1 to 6) — Staff

Travel to a foreign country for study of a specific topic. (Fall and spring)

222 Foundations of Reading Instruction—Early Childhood and Elementary School (3) — Coleman

Historical and psychological background; readiness, special approaches and skills for beginning and elementary readers; evaluation of materials; demonstrations of diagnostic, classroom, and instructional techniques. (Fall)

223 Foundations of Reading Instruction—Intermediate and Secondary School (3) — Coleman

Historical overview and need for teaching reading on these levels; informal diagnostic techniques for content teachers; selecting materials; basic reading and study skills and their application in content areas. (Fall)

224 Diagnostic Teaching of Reading (3) — Coleman

Classroom diagnostic and instructional techniques for elementary school level; construction of informal tests; administration, scoring and interpretation of informal and standardized tests; study of materials and application of readability formulas. Prerequisite: at least one previous course in reading. (Spring)

226 **Reading in Secondary School** (3) — Coleman

Extension of diagnostic and instructional techniques in Educ 223: construction of informal tests; administration, scoring, and interpretation of informal and standardized tests; evaluation of materials, including application of readability formulas; study of reading programs. Permission of instructor required. (Spring)

227 **Basic Issues in Elementary Education** (3) — Baker

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school. (Fall)

228 **Instructional Areas in Elementary Education** (3) — Baker

Current trends and research in reading, language arts, social studies, mathematics, science, music, art, and physical education.

233 **Audiovisual Education** (3) — Kubalak

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audiovisual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7. (Spring)

234 **Organization for Personalized Learning in the Open Classroom** (3) — Staff

Practical application of individualized instruction theories and methods through design, development, implementation, and revision of elementary and secondary level self-instructional packages.

235 **Analysis of Teaching** (3) — Boswell

Teaching as work: diagnosing learning skills, program planning and implementation, feedback information on both student and program. (Fall)

236 **Introduction to Education Technology** (3) — Wiggs

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems.

237 **Systems Approach to Instructional Design** (3) — Wiggs

Application of systems techniques to the development of instructional programs. A workshop design, using multi-media instruction.

241 **Education of the Gifted** (3) — Staff

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

242 **The Teacher and School Administration** (3) — Staff

Role of federal, state, and local administrative units; school finance; legal controls; school plant; public support; improving teaching conditions. (Fall and spring)

243 **Human Relations in Education and Management** (3) — Marinaccio

(Formerly Human Relations in Education)

Principles and practices in human relations between and among learner, teacher, other school personnel, parents, and community.

245 **School and Community** (3) — Marinaccio, Greenberg

The school as an important member of a team of social agencies that builds the community.

246 **Administrative Issues in Urban Education** (3) Staff
Investigation of current issues in urban education. (Fall and spring)

247 **Vocational, Technical, and Occupational Education** (3) Greenberg
Development, current concepts, agencies involved, problems, and trends in vocational, technical, and occupational education in the United States, with emphasis on the community college.

248 **The Teacher and School Supervision** (3) Tillman
Nature, organization, human relationships, and techniques. (Fall and spring)

249 **Drug Treatment and Resources** (3) Staff
Individual, social, and cultural factors related to drug abuse. Rehabilitative methods in treating drug abusers; use of community resources. (Spring)

250 **Counseling Drug Abusers** (3) Staff
Counseling theory and practice applied to drug abusers. Crisis intervention, self-help groups, and family therapy; individual and group counseling. (Fall)

251 **Foundations of Counseling** (3) Heddesheimer, Winkler
Introductory survey: definitions, scope, principles, historical background, organization, services, emerging trends, and issues. (Fall and spring)

252 **Organization and Administration of Counseling Services** (3) Vontress
Principles and procedures for designing and implementing counseling services. Admission by permission of instructor. (Spring)

253 **Individual Appraisal in Counseling** (3) Winkler
Detailed study of individual analysis and appraisal techniques. Development of systematic case study. Prerequisite: Educ 112 or equivalent. (Fall and spring)

254 **The Middle School** (3) Kulawiec
Development, organization, and practices; emphasis on the learner, the teacher, the administrator, the curriculum, and the setting of the school for the preadolescent. (Fall)

255–56 **Secondary Education** (3–3) Kulawiec
Examination of historical, psychological, sociological, and philosophical bases; emphasis on prescriptive implications. Special attention to contemporary problems and practices. (Academic year)

257 **Career Development and Information** (3) Sinick, Vontress
Theories of career development; factors influencing the world of work; procedures for evaluating and using socio-personal, educational, and occupational information. (Fall and spring)

258 **Theories and Techniques of Counseling** (3) Heddesheimer, Vontress
Theories and practices of vocational, educational, and personal coun-

seling. Prerequisite: 12 semester hours in guidance and counseling, including Educ 253 and 257. (Fall and spring)

259 **Administration of the Elementary and Secondary School** (3) Fleck

For experienced teachers and administrators. Survey of administration, including practices of modern schools. (Fall)

260 **Supervision in the Elementary and Secondary School** (3) Fleck

For experienced teachers and administrators. Review of modern supervisory concepts, including practices in schools. (Spring)

261 **Practicum in Counseling and Human Development** (3) Heddesheimer, Rashid, Vontress

Intensive counseling experience under supervision. Emphasis on relationship dynamics, analysis, recommendations and follow-up. Separate sections offered for counseling majors and human development majors. Prerequisite: Educ 258. (Fall and spring)

262 **Internship in Counseling and Human Development** (3) Heddesheimer, Rashid, Vontress

Counseling experience under University and institutional supervision in a variety of settings. Separate sections offered for counseling majors and human development majors. Prerequisite: Educ 261. (Spring)

263 **Human Resource Development: Training and Education** (3) Wiggs, Nadler

Concepts and purpose, historical backgrounds, roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development. (Fall)

264 **Design of Training Programs in Human Resource Development** (3) Nadler

Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor. (Spring)

265 **Futurism and Education** (3) Kulawiec

Contemporary view of the future through readings, discussion, simulation, games, and films. Impact of technology on humans and the environment. Future shock, alternative futures, overchoice. (Summer)

*267 **Interdisciplinary Study of Language Disorders** (3)

For graduate students in education, speech and hearing, and psychology. Psycho-educational team participation, team diagnosis and analysis of case studies. Multidisciplinary understanding of philosophies of learning and treatment of symbolic malfunctioning. (Fall)

268 **Family Counseling** (3) Winkler

The family as a system: how it affects the client and how the client affects it. Didactic presentations, role-playing, and work with simulated families. (Summer)

* An interdisciplinary course offered by the Departments of Education, Psychology, and Speech and Drama.

269–70 **School Business Management** (3–3) Fleck

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management. (Academic year)

273–74 **Teacher Education** (3–3) Boswell

Educ 273: Pre-service teacher education; evolution of program development, governance, issues, trends. Educ 274: Continuing professional development of educators; economic and social benefits to society, promising practices, financing issues. (Alternate academic years)

275 **Seminar: School Finance** (3) Fleck

Educational financial theory, practice, and control, including methods of financing. (Fall)

276 **Seminar: Public Relations in School Administration** (3) Staff

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making. (Spring)

277 **Dynamics of Change in Education** (3) Boswell

An analysis of the process of cultural change in Western society, with emphasis on education. Comparison of theories; analytical tools; historical precedents; the contemporary situation, prospects for the future.

278 **School Law** (3) Fleck

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group. (Spring)

279 **Adult Education** (3) Nadler, Wiggs

Current concepts and objectives, historical development, agencies involved, personnel, clients, programs on all levels—community through international. (Fall)

280 **Program Planning in Adult Education** (3) Wiggs

Determining educational needs for adults in school and non-school agencies; designing programs and instruction; budgeting and scheduling of adult programs. Field work with sponsoring agency. Prerequisite: Educ 279 and permission of instructor. (Spring)

283 **Higher Education in the United States** (3) Frankie

History, scope, purpose, present status, programs, and trends in higher education in the United States. (Fall and spring)

284 **Administration of Higher Education** (3) Marinaccio

Government, organization, and administration of colleges and universities; duties of trustees and administrators. (Fall and spring)

285 **Planning, Organization and Coordination of Higher Education Student Activities** (3) Burns

(Formerly Student Activities)

Focus on the skills and knowledge needed by student affairs professionals, faculty advisors, and college administrators in planning, budgeting, and dealing with policy issues related to campus programming. Includes program proposal preparation. (Spring)

287–88 **Clinical Study of Reading Problems** (3–3) Coleman, Peterson

For advanced students. Diagnostic and corrective work under supervision. Prerequisite: Educ 222 and 223 or 224 and 226. Material fee, $10 per semester. (Academic year)

289 **Organization and Administration of Reading Programs** (3) Peterson, Davis

For principals, assistant principals, supervisors, superintendents and reading teachers. Problems in planning, reorganizing and improving the total reading program. (Fall and spring)

290 **Severe Learning Disabilities in Reading** (3) Peterson

For experienced teachers. Case studies of children and/or adults with severe reading problems, planning and implementing instructional programs. Admission by permission of instructor. Material fee, $10. (Summer)

291 **Planning the School Plant** (3) Chase

Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems. (Fall)

293–94 **Research and Independent Study** (3–3) Staff

Individual research under guidance of a staff member. Program and conferences arranged with an instructor. (Academic year)

295 **Quantitative Methods II: Research Procedures** (3) Paratore, Smith

Required of all candidates for masters' degrees in education. Analysis of scientific approaches to problems in education; evaluation of research techniques. Prerequisite: Educ 112, 212; or equivalent. (Fall and spring)

297 **Personnel Administration** (3) Fleck

Organization and administration of personnel programs for educational institutions. Basic philosophy, principles responsibilities, and functions.

299–300 **Thesis Research** (3–3) Staff

Required of M.A. in Ed. degree candidates writing master's theses. (Fall and spring)

302 **Quantitative Methods III: Inferential Techniques** (3) Paratore, Smith

Educ 302 or Stat 105 is required of all doctoral students in education. Prerequisite: Educ 212 or a basic statistics course and permission of instructor. (Fall and spring)

303 **Data Analysis** (3) Paratore

Use of computer in data analysis. For doctoral students at the dissertation-planning stage. (Fall)

304 **Practicum in Supervision** (3 to 6) Fleck

Practical experience in supervision of instruction. Admission by permission of instructor.

305 **Internship: Supervision** (3 to 6) — Fleck

Service in a school situation directed by the University's faculty and school systems; integration of theory and practice.

306 **Quantitative Methods IV: Advanced Research Design** (3) — Paratore, Smith

Required of all doctoral students in education. Evaluation and application of educational research designs. Prerequisite: Educ 302 or equivalent. (Fall and spring)

310 **Museum Studies** (3) — Stapp

Study of museums' functions and their educational roles.

311 **Museum Audiences** (3) — Brenner

Study of the many audiences of many ages who use and enjoy museums.

312 **Internship in Museum Education** (6) — Stapp

Full-time placement in education departments in area museums. Supervision and seminar are provided by George Washington University faculty. Admission by permission of instructor.

316 **Recent Developments in Elementary School Social Studies** (3 to 6) — Moore

(Formerly Curriculum Developments in Elementary School Social Studies)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school social studies curriculum. Admission by permission of instructor.

317 **Recent Developments in Elementary School Science** (3 to 6) — Staff

(Formerly Curriculum Developments in Elementary School Science)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school science curriculum. Admission by permission of instructor.

320 **Recent Developments in Elementary School Mathematics** (3 to 6) — Staff

(Formerly Curriculum Developments in Elementary School Mathematics)

For experienced educational personnel. Research, techniques, materials, and innovative programs relating to the effective elementary school mathematics curriculum. Admission by permission of instructor. (Spring)

321 **Practicum in Curriculum** (3 to 6) — Staff

Supervised field experience in curriculum. Admission by permission of instructor. (Fall and spring)

322 **Internship: Reading** (3 to 6) — Peterson

Limited to doctoral students in education. Experience in a selected area of college teaching. (Fall and spring)

323 **Internship: Reading** (3 to 6) **Peterson**

Limited to doctoral students in education. Service in a school situation directed by the University's faculty and school systems; integration of theory and practice. (Fall and spring)

324 **Teaching Reading and Study Skills at the College Level** (3) Peterson

Evaluation of reading skills at the college level. Development of college reading programs, including diagnostic and teaching techniques, program planning and implementation. Prerequisite: Educ 226 or equivalent, and permission of instructor. (Summer)

325 **Curriculum Theory** (3) Tillman

Examination of reviews and research studies in curriculum theory. Focus on trends, values, interpretations, fads, design systems, and evaluation. (Spring)

330 **Foundations of Early Childhood Education** (3) McIntyre

Historical developments, philosophy and objectives of nursery schools, kindergartens and day care centers, exploration of contemporary programs and models with curriculum implications for schools in the United States and abroad. (Fall)

332 **Early Childhood Curriculum** (3) McIntyre

Writing content, approaches, methods, and materials in language arts, mathematics, science, health, social studies, and aesthetic education. (Fall)

333 **Role of the Professional in Early Childhood Education** (3) McIntyre

Planning, reporting, maintaining records, teacher-child and teacher-family interaction, diagnosis and evaluations, working with paraprofessionals. (Spring)

334 **Community Resources and Materials for the Young Child** (3) McIntyre

Interaction with community agencies for services and resources; physical facilities, including play activities and curriculum materials for the young child. (Spring)

335 **Practicum in Early Childhood Education** (3 to 6) McIntyre

Supervised professional activity in selected early childhood programs; seminar. Prerequisite: 12 semester hours in early childhood education and permission of instructor. (Fall and spring)

336 **Practicum in Reading** (3) Coleman, Peterson, and Staff

Supervised experience in testing and teaching. Approximately 120 class hours required. Admission by permission of instructor. (Fall and spring)

341 **Cognitive Models and Instruction** (3) **Rashid**

Cognitive models (Guilford, Piaget, etc.) are analyzed as the theoretical basis for planning instructional episodes appropriate at various levels—childhood through adulthood. (Fall)

342 Language Development (3) Rashid
Nature of language development; role of language in the socialization process. (Spring)

343 Advanced Studies in Human Development (3) Rashid
Review and consideration of empirical research studies on selected topics in human development. Issues, instrumentation and research needs in respect to each topic discussed. Admission by permission of the instructor. (Spring)

353 Counseling Older Persons (3) Sinick
Special considerations and counseling emphases on second careers, retirement adjustments, death and dying. (Spring)

354 Cross-Cultural Counseling (3) Vontress
Problems of and procedures for counseling culturally different clients. Emphasis on counseling cultural minorities in the United States.

355 Counseling in Groups (3) Heddesheimer, Winkler
Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling. (Fall)

356 Guidance and the Disciplines (3) Staff
For experienced counselors. Exploring the foundations of guidance through the disciplines of psychology, sociology, economics, anthropology, and philosophy.

357 Personal and Social Adjustment (3) Winkler
Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents. (Fall and spring)

358 Advanced Theories of Counseling (3) Vontress, Heddesheimer
Critical analysis and evaluation of leading counseling theories and consideration of their implications for practice. Intended for Education Specialist and Doctor of Education degree candidates whose area of concentration is counseling. Admission by permission of instructor. (Fall)

360 Job Development and Placement (3) Linkowski
Policies, principles, and processes involved in job development, modification, and placement. Emphasis on removal of barriers and on methods for placing members of special groups, such as the disabled (Spring)

361 Medical Aspects of Rehabilitation Counseling (3) Sinick
Etiology, symptomatology, and treatment of chronic and traumatic disorders with rehabilitation counseling implications. Admission by permission of instructor. (Fall)

362 Client Evaluation in Rehabilitation Counseling (3) Lofaro, Sinick
Test and non-test methods of furthering client and counselor understanding. Prerequisite: Psyc 131. (Spring)

363 Psychosocial Aspects of Rehabilitation Counseling (3) Linkowski, Lofaro
Impact of congenital and later disabilities on attitudes, self concepts

and motivations. Implications for rehabilitation counseling. Admission by permission of instructor. (Fall)

365–66 **Field Work in Rehabilitation Counseling** (3–3) Lofaro

Field work of one full day a week. Educ 365: concurrent seminar including history, philosophy, and introduction to practice. Educ 366: concurrent seminar including job analysis, placement, and follow-up. Admission by permission of instructor. (Academic year)

367–68 **Internship: Rehabilitation Counseling** (6–6) Lofaro

Supervised practice of three full days a week, with seminar providing integration of theory and practice. Prerequisite: Educ 365–66. (Academic year)

369 **Professional Issues in Rehabilitation Counseling** (3) Staff

Culminating seminar covering professional problems and ethical issues. Prerequisite: Educ 367. (Spring)

370 **College Students and Their Community** (3) Burns, Phelps

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college students' interaction with their environment. Admission by permission of instructor. (Fall)

371 **Principles and Practices in College Teaching** (3) Greenberg

General principles, methods, techniques and experimental instructional media for teaching at the college and university level. (Fall)

372 **Internship in College Teaching** (3 to 6) Greenberg

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor. (Spring)

373 **The Community-Junior College** (3) Greenberg

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges. (Fall)

374 **Current Issues in Higher Education** (3) Elliott, Marinaccio

Prerequisite: Educ 283, 284. (Spring)

375 **Foundations of a College Student Development Program** (3) Burns

College student development as an integral part of higher education programs. (Fall)

376 **College Student Development and Campus Groups** (3) Burns

Principles and procedures of student development programs with campus groups; campus group activities and development of student leadership. (Spring)

377 **Practicum in College Student Development** (3 to 6) Burns

Supervised practical experience in college student development programs. Admission by permission of instructor. (Fall and spring)

378 **Practicum in Teacher Education** (3 to 6) Brenner, Boswell

For selected experienced teachers. Supervised field work relevant to students' professional needs, to be arranged. (Fall and spring)

379 **Practicum in Adult Learning Programs** (3 to 6) Nadl
Supervised practical experience in various forms of adult educatio and human resource development. Admission by permission of in structor. (Fall and spring)

380 **Sensitivity Training: Laboratory Method** (3) Drexl
A sensitivity learning experience in human relations using unstruc tured group experience, individual feedback, experimentation, and practice. Admission by permission of department, prior to registra tion. (Fall and spring)

381 **Adult Learning** (3) Wigg
Learning theories as applied to adults in individual and group learn ing transactions; effect of age on learning; psychological, physica and social environment in adult education situations. (Fall and spring)

382 **Instructional Strategies in Adult Learning Programs** (3) Nadler
Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning programs. (Spring)

383 **Interviewing-Counseling for Human Resource Developers** (3) Wigg
Applications of interviewing, coaching and counseling skills for the human resource development specialist and others in various occu pational settings.

384 **Evaluation of Adult Learning Programs** (3) Wigg
Evaluation of adult learning programs in business, industry, govern ment, voluntary and community organizations, and agencies.

385 **Collective Negotiations in Higher Education** (3) Frankie, Rhodes
Theory, practice, problems, and issues in collective negotiations in higher education.

386 **Current Issues in Adult Learning Programs** (3) Wigg
For M.A. in Ed. degree candidates. Current issues and trends in the fields of adult education and human resource development. Admis sion of others by permission of instructor. (Spring)

387 **Administration of Adult Learning Programs** (3) Staff
Program administration in school and non-school agencies, staff re cruitment and development, fiscal operations, facilities, and mainte nance of effective community relations. (Fall)

388 **Case Studies in Higher Education Administration** (3) Marinaccio
Limited to advanced doctoral students in education. Analysis of selected hypothetical cases related to essential administrative func tions of colleges and universities. Admission by permission of in structor.

389 **Consultant-Client Relationships in Human Resource Development** (3) Nadler
Examination of the consulting process, consultant-client behaviors, and dilemmas using theory and field experience for individual and

organizational development. Prerequisite: Educ 264, 280; or approval of instructor. (Fall)

390 **Legal Problems in Higher Education** (3) Frankie

Investigation of legal problems in higher education related to the legal structure of higher education, religious concerns, students, faculty, and academic programs. (Spring)

391 **College and University Curriculum** (3) Greenberg

Development, patterns, creative design, issues, problems, evaluation, and trends in the higher education curriculum. (Spring)

392 **Financing Higher Education** (3) Frankie

Analysis of private, state, and federal revenue sources; student aid, program budgets, and financial methods and practices. (Fall)

393 **Practicum in Higher Education** (3 to 6) Frankie, Greenberg

Supervised field experiences in higher education; reports and conferences. Admission by permission of instructor. (Fall)

394 **College and University Governance** (3) Marinaccio

Organizational and administrative structures, patterns, and relationships in higher education. Prerequisite: Educ 264. (Fall)

395 **Problems and Practices in Educational Administrative Organization** (3 to 6) Marinaccio

Application of principles and practices concerned with change and evaluation of educational administration.

396 **Internship: Higher Education Administration** (3 to 6) Marinaccio

Service in a higher education situation directed by the University and the cooperating institution to integrate theory and practice. (Fall and spring)

397 **Internship: Elementary Administration** (3 to 6) Brenner

Service in a school situation directed by the University's faculty and school systems; integration of theory and practice. (Fall and spring)

398 **Internship: Secondary Administration** (3 to 6) Fleck

Service in a school situation directed by the University's faculty and school systems; integration of theory and practice. (Fall and spring)

399 **Seminar: Applied Educational Administration** (3 to 6) Fleck

Application of the theories and principles of administration to the public schools. Student participation with guidance by recognized regional practitioners.

Fourth Group

A master's degree from an accredited institution is prerequisite to all fourth-group courses. All fourth-group seminars are open to doctoral candidates or other post-master's degree students with approval of instructor. Study is individually planned on the basis of previous study and experience in the subject field to attain an advanced level of competence and to meet identified professional needs or field requirements.

Each of the following courses is offered fall and spring. Each course may be repeated for credit.

401 Seminar: History of Education (arr.) — Boswell

403 Seminar: Philosophy of Education (arr.) — Kulawiec

405 Seminar: Human Growth and Development (arr.) — Rashid

411 Seminar: Elementary Education (arr.) — Baker

413 Seminar: Secondary Education (arr.) — Kulawiec

421 Seminar: Adult Education (arr.) — Nadler

422 Seminar: Higher Education Administration (arr.) — Marinaccio

423 Seminar: Higher Education (arr.) — Marinaccio

424 Seminar: College Student Development (arr.) — Burns

425 Seminar: Teacher Education (arr.) — Boswell, Baker

427 Seminar: Human Resource Development (arr.) — Nadler

429 Seminar: Educational Personnel Administration (arr.) — Fleck

431 Seminar: Administration (arr.) — Fleck

433 Seminar: Supervision (arr.) — Fleck

441 Seminar: Curriculum (arr.) — Staff

443 Seminar: Guidance and Counseling (arr.) — Staff

445 Seminar: Research and Evaluation (arr.) — Paratore, Smith

446 Seminar: Reading (arr.) — Peterson

490 Pre-dissertation Seminar (3) — Staff

Required of all Ed.D. degree candidates. Approval of the dissertation prospectus is necessary for successful completion of the seminar. Admission by permission of instructor.

491 Dissertation Research (arr.) — Staff

Preparation of a research outline; research and writing of an approved doctoral dissertation under the direction of major advisor and dissertation committee. Prerequisite: Educ 490.

EDUCATION POLICY—DOCTORAL PROGRAM

COMMITTEE ON EDUCATION POLICY

P.E. Austin *(Chairman)*, C.J. Lange, A.D. Kirsch, H.L. LeBlanc, P.H.M. Lengermann, M.N. Rashid, C.T. Stewart, Jr.

The Graduate School of Arts and Sciences offers an interdepartmental program leading to the degree of Doctor of Philosophy in the field of education policy. The program is directed by a committee whose members are drawn from

the School of Education and Human Development and from the Departments of Economics, Political Science, Psychology, Sociology, and Statistics.

The scope of the program is policy research and analysis as it relates to education, broadly conceived. It is intended for those who wish to pursue or continue academic careers or careers in policy-making positions.

Required: the general requirements, pages 90–92, 98–100. Candidates must complete three fields of study, one of which must be education policy analysis. Each candidate is to develop a concentration within one academic discipline.

201–2 **Seminar: Current Issues in Education Policy** (3–3) Staff

Review of literature relating to current education policy issues with emphasis on use of research and analysis in formulating and evaluating policy.

220 **History of Universities** (3) Andrews

The modern university since about 1830: emphasis on recent trends and their origins; influence of earlier concepts and institutions. Higher education in its larger intellectual, social, and political context: critical examination of theories. Same as Hist 220. (Spring, odd years)

222 **Seminar: Topics in Education Policy** (3) Staff

Intensive investigation of special topics in education policy.

290 **Advanced Studies in Education Policy** (3) Staff

Supervised study and field work in selected policy areas.

ENGLISH

Professors C.D. Linton, P.H. Highfill, Jr., J.G. Allee, Jr., J.P. Reesing, Jr. *(Chairman)*, E.R. Weismiller, R.N. Ganz, Jr., G.W. Stone *(Visiting)*

Adjunct Professor J.C. Broderick

Associate Professors M.H. McClanahan *(Emeritus)*, A.E. Claeyssens, Jr., R.C. Rutledge, J.A. Quitslund, J.A.A. Plotz, J.H. Maddox

Assistant Professors C.W. Sten, G.R. Bozzini, R.L. Combs, G. Carter, G. Paster, D. McAleavey, J.R. Schneider, O.A. Seavey

Adjunct Assistant Professors C.H. Greer, L.S. Pena, A.M. Zwick, F.C. Reid, M.C. Guerrini

Assistant Professorial Lecturers R.P. Rhinehart, C. Steinberg, M.V.W. Dow, K. Evans, H. Faulkner, A.G. Jenny, R.L. Moss, J.W. Rose, L.A. Weigant

Adjunct Instructor M.A. Strom

Lecturers B.L.H. Sterman, J.M.G. Wuckovich, C.T. Bader, C.G. Beckjord, J. Greene, S. Armstrong, L. Bachorik, R.C. Bausch, B.E. Dick, W. Galligan, Jr., E.T. McClay, S. Sayres, J. Smith

Jenny McKean Moore Visiting Lecturer in Creative Writing S.R. Shreve

Bachelor of Arts with a major in American literature or English literature (field-of-study or departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the social studies and the natural and mathematical sciences.)

2. Prerequisite courses—Engl 51–52 or 61–62 or 71–72 or 191–92.

3. Required courses in related areas—(a) as appropriate, 3–12 semester hours or waiver of level 4, of a foreign language (classical Hebrew, Greek, Latin, French, German, Italian, Russian, or Spanish); (b) six semester hours of philosophy and or religion; (c) six semester hours of history (English, American, European, or world).

4. Required for the major:

(a) *Field-of-Study major*—a major examination must be passed in either American or English literature at the end of the senior year. Although no set pattern of courses is prescribed, students are expected to engage themselves with writers and works from the whole chronological span of American literature or English literature. Proseminars in American Literature, Engl 199–200 and in English Literature, Engl 195–96, assist students in their preparation for the major examination. Students who wish to be candidates for graduation with Special Honors in either American or English literature must be in the field-of-study major.

(b) *Departmental major*—30 semester hours of second-group courses offering experience with several approaches to literature which, together, make a discipline of literary study, distributed as follows:

American literature majors—Engl 120, 160, and either 161–62 or 163 and 167; three semester hours of English literature; and 15 additional hours of courses offered by the English Department, of which at least 12 hours must be in American literature.

English literature majors—Engl 120, 193–94; three semester hours of American literature; and 18 additional hours of courses offered by the English Department, of which at least 15 hours must be in English literature.

Master of Arts in the field of American literature—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in English, or 24 semester hours in English and/or American literature above the sophomore level.

Required: the general requirements, pages 90–98, including (1) 24 semester hours of course work planned in consultation with the advisor on the basis of the student's undergraduate preparation, including a minimum of six semester hours in English literature; (2) a written Master's Comprehensive Examination; (3) a master's thesis (six semester hours) written on an approved topic under the direction of the instructor in whose field the major portion of the material falls, or, with the approval of the department advisor, 12 additional semester hours in lieu of thesis.

Master of Arts in the field of English literature—Prerequisite: the degree of Bachelor of Arts with an undergraduate major in English or American literature, or 24 semester hours in English and/or American literature above the sophomore level.

Required: the general requirements, pages 90–98, including (1) 24 semester hours of course work, planned in consultation with the advisor; (2) a written Master's Comprehensive Examination; and (3) a master's thesis (six semester hours) written on an approved topic under the direction of the instructor in whose field the material falls, or, with the approval of the department advisor, 12 additional semester hours in lieu of thesis.

Doctor of Philosophy in the field of American literature—Required: the general requirements, pages 90–92, 98–100; high-level proficiency in an appropriate foreign language; the passing of a General Examination in the following four fields: (1) Early American literature to 1815, (2) 1815–1900, (3) 1900 to present, (4) a fourth field, which may be either literary or interdisciplinary. Each student plans a program in consultation with a departmental committee.

Doctor of Philosophy in the field of English literature—**Required: the general** requirements, pages 90–92, 98–100; high-level proficiency in an appropriate foreign language; the passing of a General Examination in four of the eight following fields: 1) beginnings to 1500, linguistics, and history of the language; (2) 1500–1660; (3) 1660–1800; (4) 1800–1900; (5) 1900 to present; (6) drama, including Shakespeare; (7) criticism; (8) American literature—one of the first three fields listed above under "Doctor of Philosophy in the field of American literature." **Each student plans a program in consultation with a departmental committee.**

Bachelor of Arts in Education with a teaching field in English—**Prerequisite:** the education curriculum, pages 113–14.

Required: the English option and the professional courses listed on page 117.

Students whose College Board English Composition Achievement Test scores suggest inadequate preparation may be assigned to Engl 9 or may be tested in vocabulary, reading, spelling, grammar, standard usage, and writing skill, before placement in either Engl 9 or 10. Students whose scores or writing skill indicate superior competence will be allowed to waive Engl 10; those whose scores indicate markedly superior competence will be allowed to waive both Engl 10 and Engl 11 or 12.

The admission of international students to any English course is determined by the English Placement Test for Foreign Students. Students should apply to the office of English for International Students to take this test (see page 27).

Departmental prerequisite: Engl 9 or 10 is prerequisite to all other courses in English. A 6-semester-hour course in literature, or equivalent, or written permission of the instructor, is prerequisite for admission to all second-group courses in English except Engl 115, 160–61–62, and 191–92.

ENGLISH AS A FOREIGN LANGUAGE

First Group

1 **English for International Students** (0) **Bozzini and Staff**

Elementary grammar, reading, vocabulary, and conversation. Course meets 15 class hours and five monitored laboratory hours per week. Further laboratory work encouraged. Tuition is charged at the rate of 5 semester hours; laboratory fee, $17.50.

2 **English for International Students** (0) **Bozzini and Staff**

Lower intermediate grammar, reading, vocabulary, and conversation. Course meets 15 class hours and five monitored laboratory hours per week. Further laboratory work encouraged. Tuition is charged at the rate of 8 semester hours; laboratory fee, $17.50.

3 **English for International Students** (3) **Bozzini and Staff**

Intermediate grammar, reading, vocabulary, and conversation. Course meets 10 class hours and five monitored laboratory hours per week. Further laboratory work encouraged. Tuition is charged at the rate of 5 semester hours; laboratory fee, $17.50.

4 **English for International Students** (3) **Bozzini and Staff**

Higher intermediate grammar, reading, vocabulary review, and conversation; for international students not yet ready for extended

training in composition. Course meets 10 class hours and three monitored laboratory hours per week. Further laboratory work encouraged. Tuition is charged at the rate of 5 semester hours; laboratory fee, $17.50.

5 **English Composition for International Students** (3) — Bozzini and Staff

Extended writing practice for international students showing high degree of proficiency in use of English. Development of writing skills; study of expository techniques and library research methods. Course meets four hours per week. Students completing Engl 5 with a grade of *A* or *B* will receive academic credit for the course and may enroll in Engl 11 or 12 to fulfill the Columbian College undergraduate requirement in English. Special fee, $25.

7 **English Composition for International Students** (3) — Bozzini and Staff

A more advanced composition course, following English 5, for undergraduates not yet ready to take Engl 11 or 12 and for graduate students in need of further writing practice. The course requires weekly reading and writing assignments and a research paper. Students are expected to be familiar with expository techniques and library research methods taught in Engl 5. The course meets four hours per week. Special fee, $25.

Supplementary Program

During the fall and spring semesters, a supplementary instructional program of five to seven hours per week will be required of students receiving the I-20 certificate of eligibility for the F-1 or J-1 visa for the study of English only. Courses within this program will also be open to students in the regular semester intensive courses.

The supplementary program will focus on reading improvement, the development of study skills, and further practice in writing. Tuition is charged at the rate of 3 semester hours.

ENGLISH COMPOSITION

First Group

9 **English Composition: Language as Communication** (3) — Claeyssens and Staff

Intensive grammar and composition course for students inadequately prepared for Engl 10. Detailed instruction, drill, and exercises in basic structure and writing paragraphs; also includes content covered in Engl 10. In addition a noncredit reading course, given by the Reading Center, is required for students whose test scores show a reading deficiency. Engl 9 meets five hours per week and carries three semester hours of credit; the reading course meets an additional three hours per week for a maximum of 10 weeks. Special fee, $25. (Fall and spring)

10 **English Composition: Language as Communication** (3) — Claeyssens and Staff

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and co-

herence, by analysis of selected current prose; library research procedure. (Fall and spring)

11 **English Composition: Language and the Arts and Sciences** (3) Claeyssens and Staff

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12. (Fall and spring)

12 **English Composition: Language in Literature** (3) Claeyssens and Staff

Study and practice of expository and argumentative techniques through critical writing; emphasis on the rhetorical complexities of stylistics in the sentence and diction, and on logical thought, by the study of literary genres, and of the use of language in literature. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 12 cannot receive credit for Engl 11. (Fall and spring)

Second Group

101 **Expository Writing** (3) McClanahan, Moore

Types of expository writing; weekly exercises based on students' needs; particular attention may be given to problems in the writing of graduate theses. Prerequisite: Engl 9 or 10; 11 or 12. (Fall and spring)

102 **Introduction to Creative Writing** (3) McAleavey
(Formerly Narrative Writing)

Discussion of student poetry and/or prose fiction. Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. The student should submit a writing sample to the instructor before registration. (Fall and spring)

103 **The Writing of Fiction—the Short Story** (3) McAleavey

Prerequisite: Engl 102; consent of instructor. The student should submit a writing sample to the instructor before registration. (Fall)

104 **The Writing of Poetry** (3) McAleavey

Prerequisite: Engl 102; consent of instructor. The student should submit a writing sample to the instructor before registration. (Fall)

105–6 **The Writing of Plays** (3–3) Claeyssens

Same as SpDr 105–6. Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. The student should submit a writing sample to the instructor before registration.

107 **The Writing of Fiction—the Novel** (3) Claeyssens

Prerequisite: Engl 102 or 103; consent of instructor. The student should submit a writing sample to the instructor before registration. (Spring)

108 **Advanced Creative Writing** (3) Staff
(Formerly Advanced Writing—Poetry and Prose)

Prerequisite: Engl 9 or 10; 11 or 12; 102; consent of instructor. The

student should submit a writing sample to the instructor before registration. (Spring)

110 **Composition for Teachers of English in High School** (3) Strom
Analysis of the problems of grammar, mechanics, and basic rhetorical principles in high school English teaching.

Third Group

201–2 **The Teaching of Composition** (3–3) Claeyssens and Staff
(Academic year)

ENGLISH LITERATURE

First Group

51–52 **Introduction to English Literature** (3–3) Rutledge and Staff
Representative works by major authors studied in their historical context; discussion of recurrent themes, and introduction to various types and forms of imaginative literature. (Academic year)

61–62 **Comedy and Tragedy** (3–3) Carter, Paster
Modes of comedy and tragedy as developed in drama, nondramatic verse, and prose fiction in literatures from ancient to modern times. Engl 61: comedy —Chaucer to Borges. Engl 62: tragedy—Book of Job to Beckett. (Academic year)

Second Group

111 **Medieval English Literature—Exclusive of Chaucer** (3) Allee

112 **Chaucer** (3) Allee
(Spring)

115 **Introduction to English Linguistics** (3) Allen
Development of the English language in a historical treatment of English grammar. (Fall)

116 **Medieval Legend and Saga** (3) Allee
Celtic and Norse.

117–18 **English Poetry: Form and Content** (3–3) Weismiller
Traditional and modern poetry; emphasis on the ordering of language by which poetry brings into being patterns of thought and feeling which release meaning.

120 **Practical Criticism** (3) Plotz
Uses of language and complex shapes of thought in literature; introduction to mature study and full enjoyment of poetry, fiction, and drama. (Fall and spring)

123 **Principles of Literary Criticism** (3) Carter
Works of major critics; consideration of ways in which literature is analyzed, classified, judged, and justified; Aristotle, Longinus, Dryden, Johnson, Coleridge, Schiller, Arnold, Eliot, Richards, Frye. (Fall)

125–26 **Elizabethan Verse and Prose** (3–3) Quitslund

127–28 **Shakespeare** (3–3) Highfill
Development of dramatic forms and recurrent themes. Engl 127: histories and comedies. Engl 128: tragedies. (Academic year)

129 **The Earlier 17th Century** (3) Reesing
Poetry and prose to 1660, exclusive of Milton.

130 **Milton** (3) Reesing

131–32 **English Literature, 1660-1780** (3–3) Highfill
Poetry and prose of the Neoclassic period. Engl 131: 1660–1740. Engl 132: 1740–1780. (Academic year)

133–34 **The Romantic Movement** (3–3) Plotz
Engl 133: Blake, Wordsworth, Coleridge. Engl 134: Byron, Shelley, Keats. (Academic year)

135–36 **Victorian Literature** (3–3) Carter
Engl 135: Tennyson, Browning, Arnold; Dickens; Carlyle, Ruskin. Engl 136: George Eliot, Browning, Tennyson, Swinburne, Hardy, Hopkins, Wilde, Pater.

137–38 **The 20th Century** (3–3) Linton
Literature since 1900. Engl 137: poetry and criticism. Engl 138: drama and the novel. (Academic year)

145–46 **Special Topics in English Literature** (3–3) Maddox, Carter
Engl 145: English and American Gothic: the literature of terror. Engl 146: English love poetry. Each course may be repeated for credit. (Academic year)

147–48 **Special Topics in English Literature** (3–3) Maddox, Plotz
Engl 147: Irish literature in the 20th century—with special emphasis on Joyce and Yeats. Engl 148: George Eliot and the "Lady Novelists." Each course may be repeated for credit. (Academic year)

151 **19th-Century British Poetry** (3) Staff
Readings in Wordsworth, Keats, Browning, and Swinburne.

153–54 **The English Novel** (3–3) Maddox
Major novelists. Engl 153: 18th century. Engl 154: 19th century. (Engl 154—fall)

155–56 **The English Drama** (3–3) Paster
Engl 155: Shakespeare's contemporaries. Engl 156: Historical survey, 1660 to present.

157 **20th-Century Drama** (3)
Representative continental, English, and American plays of the 20th century.

158 **20th-Century British Prose Fiction** (3)

191–92 **Introduction to European Literature** (3–3) Plotz and Staff
Selected major works in various genres, read in translation and in entirety. Engl 191: *Iliad* and *Aeneid;* dramas from ancient to modern

times. Engl 192: Plato, Ovid, and Dante; medieval saga and romance; prose fiction from Cervantes to Mann. Open to freshmen and sophomores. May be taken to satisfy the requirement for meaningful initiation into the humanities. (Academic year)

193–94 **History of English Literature** (3–3) Reesing
(Academic year)

195–96 **Proseminar in English Literature** (3–3) Paster
For field-of-study majors in English literature. Themes and concerns basic to the English literary tradition, which draw connections between diverse works from the Old English period to recent times. (Academic year)

197 **Independent Study** (3) Reesing and Staff
Open to honors candidates in the field-of-study major in English literature during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Ganz and Staff
Independent study. Under the guidance of an instructor, the student writes a thesis on an approved topic. Open to qualified seniors in the field-of-study major in English literature. (Fall and spring)

Third Group

212 **Studies in Chaucer** (3) Allen

213 **Old English** (3) Allen
Old English grammar and readings. (Fall)

214 **Beowulf** (3) Allen
Prerequisite: Engl 213 or equivalent. (Spring)

217 **English Poetry: The Formal Development** (3) Weismiller

218 **Form and Content in Modern Poetry** (3) Weismiller

219 **Research Methods and Bibliographical Materials** (3) Broderick
Principal bibliographical sources and typical problems in research. (Fall)

223–24 **Studies in Literary Criticism** (3–3) Plotz

225–26 **Studies in 16th-Century English Literature** (3–3) Quitslund

227–28 **Studies in Shakespeare and his Contemporaries** (3–3) Paster
(Academic year)

229 **Studies in English Literature, 1600-1660** (3) Reesing
Chief figures exclusive of Milton.

230 **Studies in Milton** (3) Reesing

231–32 **Studies in English Literature, 1660–1780** (3–3) Highfill

233–34 **Studies in the Romantic Movement** (3–3) Plotz

235–36 **Studies in Victorian Literature** (3–3) Carter
(Academic year)

237–38 **Studies in 20th-Century Literature** (3–3) Linton

253–54 **Seminar: The English Novel** (3–3) Maddox

255–56 **Studies in Dramatic and Theatrical History** (3–3) Highfill
Engl 256: Seminar in drama and theater of the Restoration and 18th century, held among the Folger Library collections. A Folger Institute Seminar.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

George Washington University is a member of the Folger Institute of Renaissance and 18th-century Studies. Institute policies are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid. Folger Institute Seminars are numbered 301 through 308. Students wishing to register for these courses should consult the chairman of the English Department.

301–308 **Folger Institute Seminars** (3 credits each) Staff
Topics will be announced.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

AMERICAN LITERATURE

First Group

71–72 **Introduction to American Literature** (3–3) Ganz and Staff
Historical survey. Engl 71: From beginnings to the Civil War. Engl 72: From the Civil War to present. (Academic year)

Second Group

120 **Practical Criticism** (3) Plotz
Uses of language and complex shapes of thought in literature; introduction to mature study and full enjoyment of poetry, fiction, and drama. (Fall and spring)

160-61-62 **Studies in American Literature** (3–3–3) Seavey, Combs, Schneider
Same as AmCv 160–61–62. Major factors in the national cultural tradition as shown by outstanding writers. (Engl 160, 162—fall; 161—spring)

163–64 **Major American Poets** (3–3) Ganz
Advanced critical study of significant writers and movements. Engl 163: From beginnings through the 19th century. Engl 164: The 20th century. (Academic year)

165–66 **American Drama** (3–3) Claeyssens, Com
Historical and critical study of significant plays and forms. Engl 16
From beginnings to 1930. Engl 166: Since 1930. (Academic year)

167–68 **The American Novel** (3–3) Combs, Claeysse
Historical and critical study of significant novels. Engl 167: Fro
beginnings through the 19th century. Engl 168: The 20th centur
(Academic year)

170 **The American Short Story** (3) Comb
Historical development of the American short story. (Spring)

171–72 **Major American Writers** (3–3) Ga
Engl 172: Three American "Naturists": William James, Theodor
Dreiser, and William Carlos Williams. Each course may be repeate
for credit. (Spring)

173–74 **Selected Literary Movements** (3–3) Schneider, McAleave
Engl 173: Regionalism in American literature. Engl 174: An interna
tional context for contemporary American poetry. Each course ma
be repeated for credit. (Academic year)

175–76 **Special Topics in American Literature** (3–3) Plot
Engl 175: Jewish-American writing. Each course may be repeated for
credit. (Fall)

177–78 **Contemporary American Literature** (3–3) Ganz, Claeyssens
Major and representative works since World War II. (Academic
year)

181–82 **TBA** TBA
Two special courses offered each year by the Jenny McKean Moore
Visiting Lecturer in Creative Writing. Each course may be repeate
for credit. (Academic year)

197 **Independent Study** (3) Reesing and Staff
Open to honors candidates in the field-of-study major in American
literature during their senior year. (Fall and spring)

198 **Senior Honors Thesis** (3) Ganz and Staff
Independent study. Under the guidance of an instructor, the student
writes a thesis on an approved topic. Open to qualified seniors in
the field-of-study major in American literature. (Fall and spring)

199–200 **Proseminar in American Literature** (3–3) Seavey
For field-of-study majors in American literature. Readings, con-
ferences, and group discussions. (Engl 199—spring)

Third Group

219 **Research Methods and Bibliographical Materials** (3) Broderick
Principal bibliographical sources and typical problems in research.
(Fall)

263–64 **Studies in American Poetry** (3–3) Ganz
(Engl 264—fall)

267–68 **Seminar: American Fiction** (3–3) Maddox
Research and critical reading: fiction and the criticism of fiction.

281–82 **Seminar: Early American Literature** (3–3) Seavey

283–84 **Studies in American Romanticism** (3–3) Broderick
Engl 283: Melville—the early fiction. Engl 284: Emerson, Thoreau, and the Concord Group: the intellectual background and the literary achievement. (Engl 284—spring)

285–86 **Seminar: American Literature, 1865-1900** (3–3) Schneider
Realism in America. (Engl 286—spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ENVIRONMENTAL STUDIES

COMMITTEE ON ENVIRONMENTAL STUDIES

A.K. Fitzsimmons (*Chairman*), O. Bergman, R.S. French, R.W. Kenny, R.C. Lindholm, H. Merchant, W.E. Schmidt, A.M. Yezer

Columbian College of Arts and Sciences offers interdepartmental programs in environmental studies leading to the degree of Bachelor of Arts or Bachelor of Science. The program leading to the degree of Bachelor of Arts is designed for the student whose orientation is essentially political or social and who expects to enter law, politics, urban planning or other areas for the purpose of altering society's responses to environmental problems. The program leading to the degree of Bachelor of Science is designed for the student with well-developed interests in science who seeks professional identification as a field or laboratory worker in the environmental sciences.

Bachelor of Arts with a major in Environmental Studies (Departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses (qualified students may substitute advanced courses with departmental permission, in order to include more elective courses in their program):
   (a) Statistics—Stat 91.
   (b) Natural sciences—six to eight semester hours selected from BISc 3–4,

11–12; Chem 11–12; Geol 1–2, 21–22; or Phys 1, 2. Courses designated for n science majors must be passed with a grade of *A* or *B* to be accepted tow fulfilling the introductory natural science requirement. This includes BiSc 1- and Geol 1–2.

(c) Social studies—12 semester hours selected from Anth 1–2; Econ 1- Geog 51, 52; PSc 1 or 3, 2; Psyc 1, 5–6; or Soc 1, 2.

3. Required courses in the major (48 semester hours):

(a) BiSc 140 (four semester hours).

(b) Eight semester hours selected from BiSc 101, 102, 103, 108, 109, 110, 1 115, 118, 123, 124, 125, 127, 135, 141, 143, 144, 145, 146, 149, 150, 161, 167, 1 208, 210, 211, 237, 242; Chem 22, 50, 122, 151–52, 153–54; Geol 5, 125, 128, 1 147, 163, 181, 272; Phys 6, 14, 15, 16, 27–28.

(c) 30 semester hours in courses selected from two departments in t following—Anth 151, 152, 170, 186, 263, 267; Econ 101, 102, 136, 157, 158, 1 199, 237; Geog 127, 132, 135, 140, 142, 144; PSc 111, 112, 117, 118, 120, 122, 1 Psyc 104, 144, 151, 156; Soc 126, 127, 128, 151, 152, 181.

(d) Envr 151–52 (six semester hours).

Bachelor of Science with a major in Environmental Studies (Departmental) The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.

2. Prerequisite courses (qualified students may substitute advanced cours with departmental permission, in order to include more elective courses in thei program):

(a) Statistics—Stat 91.

(b) Natural sciences—12 to 16 semester hours selected from BiSc 11–12 Chem 11–12; Geol 21–22; Phys 1, 2. Either BiSc 11–12 or Chem 11–12 must b selected.

(c) Social studies—12 semester hours selected from Anth 1–2; Econ 1- Geog 51, 52; PSc 1 or 3, 2; Psyc 1, 5–6; Soc. 1, 2.

3. Required courses for the major (48 semester hours):

(a) BiSc 140 (four semester hours).

(b) 20 semester hours selected from BiSc 101, 102, 103, 108, 109, 110, 11 115, 118, 123, 124, 125, 127, 135, 141, 143, 144, 145, 146, 149, 150, 161, 167, 16 208, 210, 211, 237, 242; Chem 22, 50, 122, 151–52, 153–54; Geol 5, 125, 128, 14 147, 163, 181, 272; Phys 6, 14, 15, 16, 27–28.

(c) 18 semester hours selected from Anth 151, 152, 170, 186, 263, 267; Econ 101, 102, 136, 157, 158, 161, 199, 237; Geog 127, 132, 135, 140, 142, 144; PSc 104 111, 112, 117, 118, 120, 122, 187; Psyc 104, 144, 151, 156; Soc 126, 127, 128 151, 152, 181.

(d) Envr 151–52 (six semester hours).

The science and social studies courses listed under 3(b) and 3(c) above must be taken in not more than three departments. Not more than six hours service-learning courses may count toward fulfilling requirements of the major.

In choosing elective courses for both the Bachelor of Arts and Bachelor of Science degree programs, students are reminded that permission of the Dean of Columbian College of Arts and Sciences and the Committee on Environmental Studies is necessary to take courses not offered by Columbian College of Arts and Sciences, and that a maximum of 12 semester hours of such courses may be taken. The following may be of interest to the environmental studies major: BAd 101, 171, 201, 203; *CE 194, 197; HKLS 152; U&RP 153, 201, 205 The permission of the instructor, the department chairman, and the Dean of the School of Government and Business Administration is necessary to take graduate courses (numbered 201 and above) in that School.

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* See the *School of Engineering and Applied Science Bulletin* for civil engineering courses.

151–52 **Senior Seminar in Environmental Studies** (3–3) Staff
Limited to majors in environmental studies. Directed reading and discussion of contemporary environmental problems.

159–60 **Field Experience** (3–3)
Open to juniors and seniors majoring in environmental studies. Students will spend at least eight hours per week in a political, technical, legal, or special interest organization working on environmental questions.

EXPERIMENTAL HUMANITIES*

Associate Professors R.S. French *(Director)*, M. Kernan *(Visiting)*
Adjunct Instructor P.E. Wallace, Jr.

EXPERIMENTAL HUMANITIES

First Group

2–3 **Politics and Values** (3) Staff
(Formerly Hum 4 and 6)
A freshman course; limited enrollment. Students will be housed in Thurston Hall. Field-study and case-study of value conflicts implicit in selected political issues involving federal policy and legislation. Concurrent registration in special sections of PSc 2 and 3 required. Students registering for Hum 2 in the fall semester will be required to register for Hum 3 in the spring semester. Admission by permission of instructor. (Fall and spring)

†26 **Environmental Issues** (3) French, Fitzsimmons, Merchant
An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Spring)

40 **Washington, D.C.: Culture and Politics** (3) Interdisciplinary Team
An all-university course designed primarily for freshmen and transfer students. Major facets of metropolitan life, past and present, analyzed by faculty, students, and community leaders. (Fall)

72 **Language of Cinema** (3) Kernan
Introduction to cinema as language through analysis of the components of film structure—camera, editing, sound, movement, music, dialogue and mise-en-scéne. Class work includes reading, visual communication exercises and a final project. Admission by permission of instructor. (Fall)

91–92 **The Creative Process** (3–3) Claeyssens and Interdisciplinary Team
The process of invention in the arts. Professors of drama, dance, film,

* Administered by the Division of Experimental Programs.
† Offered jointly by the Division of Experimental Programs and the Departments of Biological Sciences and Geography and Regional Science.

art, and English participate. Examination of documents in whic artists in all fields discuss work in process. Exchange with practic artists through visits to rehearsals and studios and through discu sion with visiting artists and critics. (Academic year)

Second Group

101–2 Supervised Field-Study (6–6) Frenc
Community-based projects supervised by appropriate faculty. Junio and seniors admitted by permission of instructor. Prerequisite Hum 102: Hum 101. (Hum 101 and 102—fall and spring)

158 Film Directors and Styles (3) Kerna
Examination of influence on major film directors of twentieth-centu art movements: German expressionism, Soviet constructivism, su realism, neo-realism and structuralism. Comparison of film narrativ with styles in other art forms. (Fall)

161 Special Studies in Film (3) Kerna
An intensive study of film structure as exemplified by the work of single director or film genre. (Fall and spring)

171 The Legal Process (3) Wallac
The function which law plays in society and the nature of the legal process. Examination of the societal assumptions and values that mold the law. Emphasis upon institutions that make up the law—the courts, administrative agencies, legislative bodies, and executive agencies. Open only to juniors and seniors by permission of instructor. (Academic year)

174 Science and Values (1 or 3) Schmidt, Parke
Study of the effects of scientific knowledge and technology on social institutions and the image of man, of the question of ethics and morality in science, and of the science of values. Admission by permission of instructor.

198 Conference on Policy Studies and the Humanities (3 or 6) Staff
Examination of a selected policy issue (e.g., health care, freedom of information, drug abuse) in relation to alternative social goals. Open to graduate, law, and medical students, as well as advanced undergraduates by permission of instructors.

SERVICE-LEARNING EXPERIMENTAL HUMANITIES

See **Service-Learning Program.**

FORENSIC SCIENCES—GRADUATE PROGRAMS

Professors T.P. Perros, J.E. Starrs, T.F. Courtless, Jr., C. O'Rear *(Chairman)*
Professorial Lecturer B.J. White
Adjunct Professor C.G. McWright
Associate Professorial Lecturers D.D. Garner, J.T. Smith, R. Golten, J.T. Wieseman, G.M. Saiger, R.S. Bennett, E.G. Howe, R. Brunelle

Assistant Professorial Lecturers K.E. Melson, J.D. Kogan, D.I. Labowitz, C. Smiley, H.F. Schuelke III, L.H. Wechsler

Master of Forensic Sciences—Prerequisite: a bachelor's or a graduate degree from an accredited institution of higher learning and academic or professional experience in the behavioral, biological, or physical sciences, or law, medicine, or law enforcement.

Required: the general requirements, pages 90–98. For students not electing a thesis, 36 semester hours of course work are required; for students electing a thesis, 30 semester hours of course work, plus a thesis (equivalent to six semester hours), are required. ForS 220 is required of all students; ForS 224 is required of students who do not have a LL.B. or J.D. degree. The following are also required: (1) at least nine hours in the forensic physical sciences selected from ForS 201, 202, 203, and 204; (2) at least six hours in forensic medicine selected from ForS 214, 260, 261, and 269; (3) at least six hours in law and the administration of justice from ForS 225, 227, 228, and 251; (4) the remaining semester hours must be selected in consultation with the advisor so that each program of study includes at least 21 hours selected from the forensic physical sciences, forensic medicine, the physical and natural sciences (including basic medical sciences), and research or a thesis. Other course work may be selected from the behavioral sciences, law, management science, or forensic sciences. It is strongly recommended that students participate in the internship program. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

Master of Science in Forensic Science—Prerequisite: a bachelor's or graduate degree in the biological or physical sciences from an accredited college or university.

Required: the general requirements, pages 90–98. The program of study consists of 30 semester hours of course work, plus a thesis (equivalent to six semester hours). Individualized programs of study will be developed to meet the career objectives of each student. Students may specialize in forensic chemistry, toxicology, or serology. Each such program of study must include ForS 251. All candidates must also participate in the departmental seminar each semester. The remaining semester hours must be selected from approved courses in the forensic sciences, biological and physical sciences, management science, law, or basic medical sciences. It is strongly recommended that students participate in the internship program. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

Master of Arts in Special Studies—Prerequisite: a bachelor's or graduate degree from an accredited college or university.

Required: the general requirements, pages 90–98. The program of study consists of 36 semester hours of approved course work drawing upon the forensic sciences, law, criminology, management science, sociology, and psychology. ForS 220, 224, 225, 228, 254, 265, 266, Soc 258, 261, 263, PAd 223, and Mgt 201 are recommended. All candidates are required to pass a written Master's Comprehensive Examination. There is no tool requirement.

The interdisciplinary programs leading to the degrees of Master of Forensic Sciences and Master of Science in Forensic Science may include course work from the School of Government and Business Administration, from the National Law Center, from the School of Medicine and Health Sciences, and graduate course work in the behavioral, biological, and physical science departments of the University. Students work closely with their advisors in setting up a program that meets their interests, needs, and background knowledge. The Department of Forensic Sciences is affiliated with the Armed Forces Institute of Pathology in a program of mutual exchange among students, courses, and facilities. For further information, contact the Department of Forensic Sciences.

201 Forensic Serology (3) Garner, Lapp

Fundamental analysis of blood and other biological materials. Specifi procedures and techniques used in forensic serology—from presum tive tests to blood enzyme classifications. Laboratory exercis

202 Instrumental Analysis (3) Perros, Row

Principles and application of various instrumental methods to th examination of criminal evidence, including chromatographic an spectrophometric techniques and mass spectrometry. Laboratory ex ercises.

203 Examination of Questioned Documents (3) Staf

Theory and principles of handwriting and handprinting, duplicatin processes, paper manufacture and fiber analysis; studies of pape and methods of examining questioned documents. Laboratory ex ercises.

204 Firearms and Tool-mark Identification (3) Rowe

Methods for identifying firearms, cartridge casings, tool-marks, tir marks, and footprints. Laboratory exercises.

214 Forensic Psychiatry (3) Howe, Saiger, Smith

Introduction to the constructs of dynamic psychiatry, psychiatric treatment, and the nomenclature of mental disorders. Consideration of expert testimony, direct examination, and cross-examination in hospitalization and criminal cases.

220 Introduction to Forensic Science (3) Given, O'Rear, Rowe

Survey of the forensic physical sciences; qualifications and prepara tion of expert witnesses and their court roles in criminal and civil cases; operation and functioning of the forensic laboratory.

224 Introduction to Criminal Law (3) Starrs, Golten, Bennett, Wieseman

Principles of criminal law and procedure, preparation and presenta tion of evidence, examination of witnesses, and methods of legal research.

225 Advanced Criminal Evidence (3) Melson, Labowitz

Procedural rules affecting the collection and use of physical evi dence. Emphasis on court opinions defining the rules of search and seizure and admissibility of evidence. Prerequisite: ForS 224 (Spring)

227 Advanced Criminal Procedure (3) Schuelke, Wechsler

Decision to arrest, prosecutive discretion, bail, the preliminary hear ing, right to a speedy trial, discovery, plea bargaining, publicity post-conviction procedures. Prerequisite: ForS 224.

228 Administration of Criminal Justice (3) Smiley

Consideration and analysis of selected advanced problems in the administration of criminal justice. Emphasis on the role and profes sional responsibilities of prosecutor and defense counsel and on de velopmental trends in the law. Prerequisite: ForS 224.

250 Multidisciplinary Aspects of Forensic Science (3) Starrs

Scientific and legal aspects of current concepts. Includes qualification

as an expert witness, chain of custody, impact of testimony on the jury, admissibility of evidence, class evidence vs. individualized evidence, and search and seizure.

251 **Moot Court** (3) Kogan

Students will prepare and present direct testimony and be cross examined by an experienced trial attorney in simulated courtroom setting. Class discussions of problems, techniques. Lectures on discovery, admissibility of scientific evidence, chain of custody, use of notes, etc.

254 **Selected Topics in the Forensic Sciences** (3) Staff

Current issues in research, investigation, and law.

260 **Introduction to Forensic Medicine** (3) Dixon, Thompson

Anatomy and physiology of the human body with emphasis on understanding the processes underlying traumatic and unexpected deaths encountered in forensic pathology. Bone growth and repair as it relates to child abuse, structure and functions of the heart relating to sudden death, and anatomic area of the brain prone to hemorrhagic lesions following trauma.

261 **Introduction to Forensic Pathology** (3) Dixon, Thompson

Terminology and scientific techniques used in medico-legal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

265 **The Illicit Use of Drugs** (3) Lappas, O'Rear

Chemical, pharmacological, toxicological, and pathological characteristics of commonly abused drugs, including ethanol, barbiturates, narcotics, stimulants, and hallucinogens. Primarily for M.A. in Sp.Std. degree candidates; open to others with permission of instructor.

266 **Seminar: Modern Trends in Criminal Justice** (3) O'Rear

Recent advances in criminal justice. Discussions incorporate several disciplines including science, law, management, social sciences, and psychology.

268 **Photography in the Forensic Sciences** (3) Staff

Basic use of forensic photography, including selection and use of equipment, photographs as evidence, close-up work, and common misconceptions. Laboratory fee, $25.

269 **Forensic Toxicology** (3) O'Rear, Lappas

Relevant underlying biological, chemical, and pharmacological principles of forensic toxicology.

270 **Medicinal Chemistry** (3) O'Rear

Theory and principles of classification, synthesis, and structure activity relationships of drugs. Discussion of the complex chemical events that take place between administration of a drug and its action on the user, with emphasis on drugs of abuse.

271 **Advanced Forensic Serology** (3) Garner, Lappas

Advanced techniques in forensic serology and enzymology. Emphasis on practical laboratory examinations and classifications of dried blood stains. Among systems presented are ABO and subgroups, MN,

Rh, phosphoglocumutase, erythrocyte acid phosphatase, and adeny
late kinase isoenzymes. Laboratory fee, $25. Prerequisite: ForS 20
or permission of instructor.

272 **Advanced Forensic Toxicology** (3) Lappa
Lectures, student seminars, laboratory demonstrations, and exercise
dealing with advanced laboratory techniques and other topics of cu
rent interest in forensic toxicology. Prerequisite: ForS 269 or permis
sion of instructor. Laboratory fee, $25.

273 **Forensic Chemistry** (3) Row
Advanced course in the recognition, collection, preservation, an
analysis of trace evidence. Includes soils, paint, hairs, fibers, an
arson accelerants. Laboratory exercises include classical chemica
techniques, as well as more advanced instrumental methods of analy
sis. Prerequisite: ForS 202 or permission of instructor. Laborator
fee, $25.

274 **Forensic Laboratory Management** (3) O'Rear, Whit
Theories of management with emphasis on laboratory leadership
Interaction of individuals, groups, managers, and the organization a
a whole. Discussions centered on the forensic laboratory as an or
ganization and as a system within a larger organization.

295 **Research** (arr.) Staf
Open to qualified master's degree students. Research on problem
approved by the department chairman or academic advisor, under
the supervision of an appropriate staff member. Laboratory exercises
in those methods in principal use in crime laboratories.

299–300 **Thesis Research** (3–3) Staf
(Fall and spring)

FRENCH

See **Romance Languages and Literatures.**

GENETICS—GRADUATE PROGRAMS

Committee on Genetics

S.O. Schiff *(Chairman)*, W.F. Anderson, D. Brusick, R. Crystal, R.F
De Giovanni-Donnelly, R.C. Gallo, D. Gillespie, C.B. Jacobson, D. Johnson
P.D. Kind, K. Krell, W.M. Leach, W. Merrick, C.R. Merril, A. Mesche
W.G. Nash, S. O'Brien, J.C. Petricciani, J. Schlom, K. Todaro

The Graduate School of Arts and Sciences offers an interdepartmental pro
gram leading to the degrees of Master of Science and Doctor of Philosophy i
the field of genetics. This program is directed by a committee whose member
are drawn from the Departments of Biochemistry, Biological Sciences, Chil
Health and Development, Microbiology, Obstetrics and Gynecology, and Phar
macology; and from four government agencies—the Bureau of Radiological
Health, the National Institutes of Health, the National Institute of Mental Health
and the Food and Drug Administration.

A baccalaureate degree is required for admission to the degree program. The undergraduate program must have included the following: eight semester hours each in biology, inorganic chemistry, and organic chemistry; six semester hours in physics; and six semester hours in English composition and literature. While not required for admission, courses in embryology, genetics, and mathematics are strongly recommended.

Master of Science in the field of genetics—Required: the general requirements, pages 90–98. The 30 semester hours required in this program must include Gnet 201–2 and Gnet 299–300. The remaining 20 semester hours of course work are to be selected, with the approval of the Committee on Genetics, from the departmental courses listed below. The tool requirement may be met by satisfactorily completing an approved course in biostatistics or by passing a foreign language reading examination.

Doctor of Philosophy in the field of genetics—Required: the general requirements, pages 90–92, 98–100. The program of study must include Gnet 301–2, eight to 10 semester hours of biochemistry, six to eight semester hours of cell biology, 10 to 12 semester hours of genetics, and two or three semester hours of statistics. These courses may be selected from the departmental listings below. The tool requirement may be met by the satisfactory completion of an approved course in biostatistics and the passing of a foreign language reading examination, preferably in French or German.

GENETICS

Third Group

201–2 **Advanced Problems in Genetics** (2–2) **Staff**

Gnet 201: lecture, seminar. Gnet 202: individual study with each member of the Committee on Genetics. Required of all master's degree candidates in the field of Genetics. (Academic year)

295 **Research** (arr.) **Staff**

Open to qualified master's degree students. Research on problems approved by the Committee on Genetics. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**

(Academic year)

Fourth Group

301–2 **Advanced Problems in Genetics** (2–2) **Staff**

Gnet 301: lecture, seminar. Gnet 302: individual study with each member of the Committee on Genetics. Required of all students preparing for the Doctor of Philosophy general examination whose field of study is genetics. (Academic year)

398 **Advanced Reading and Research** (arr.) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

ANATOMY

203 *Human Embryology* (1)
256 *Human Genetics* (1)
260 *Electron Microscopy in Cellular Biology—Lecture* (1)
261 *Transmission Electron Microscopy* (3)

BIOCHEMISTY

221–22 *General Biochemistry* (3–4)
223–24 *Biochemistry Laboratory* (1–1)
227 *Biochemistry Seminar* (1)
232 *Protein Chemistry I* (1)
233 *Protein Chemistry II* (1)
241 *Isotopes* (3)
266 *Biochemical Genetics and Inherited Metabolic Diseases* (1)

BIOLOGICAL SCIENCES

Biology

108 *Organic Evolution* (3)
111 *Introductory Microbiology* (4)
122 *Cell Biology I: Molecular and Subcellular Biology* (3)
123 *Cell Biology II: Cell Biochemistry* (3)
124 *Cell Biology II: Cell Biochemistry Laboratory* (2)
127 *Genetics* (3)
128 *Genetics Laboratory* (1)
129 *Cell Biology III: Cell Physiology* (3)
130 *Cell Biology III: Cell Physiology Laboratory* (1)
138 *Advanced Genetics* (3)
167 *Radiation Biology* (3)
206 *Seminar: Radiation Biology* (3)
220 *Seminar: Cell Physiology* (3)
227 *Seminar: Genetics* (3)
228 *Population Genetics* (3)
229 *Cytogenetics* (3)
248 *Analysis of Development* (3)
249 *Seminar: Developmental Biology* (3)

Zoology

145 *Introduction to Vertebrate Embryology* (4)
146 *Experimental Developmental Biology* (4)

MICROBIOLOGY

211 *Microbiology* (4)
214 *Tissue Cell Culture and Somatic Variation* (3)
229 *Immunology* (3)

230 *Immunology Laboratory* (2)
231 *Immunobiology* (1)
233 *Virology* (3)
234 *Virology Laboratory* (2)
258 *Microbial Genetics* (2)
260 *Cellular Immunology* (1)

PHARMACOLOGY

203 *Fundamental Principles of Pharmacology* (3)
256 *Molecular Pharmacology* (2 or 3)
258 *Cancer Chemotherapy* (1)

STATISTICS

91 *Principles of Statistical Methods* (3)
117 *Analysis of Variance* (3)
127 *Statistics for the Biological Sciences* (3)
153–54 *Mathematical Models in Population Genetics* (3–3)

GEOGRAPHY AND REGIONAL SCIENCE

Professors M. Gordon *(Chairman)*, F. Belaunde-Terry *(Visiting)*
Professorial Lecturers J.W. Nystrom, J. Baclawski, S. Baum
Associate Professors J.C. Lowe, E.O. Pederson
Associate Professorial Lecturer P. True
Assistant Professor A.K. Fitzsimmons
Assistant Professorial Lecturers D.E. Starsinic, J.F. Long
Adjunct Instructor C.M. Hock
Lecturer D.L. Plondke

Bachelor of Arts with a major in Geography (Departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Required courses in the major—30 semester hours of second-group geography and regional science courses, including Geog 105, to be chosen in consultation with the undergraduate advisor.

Master of Arts in the field of Geography—Prerequisite: a Bachelor of Arts degree with a major in geography from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. The minimum requirement consists of 30 semester hours of approved course work including a thesis: with the approval of the department, a student may elect a program of study without a thesis. A Master's Comprehensive Examination in three fields is required. Candidates must fulfill the tool requirement in one of three ways: (1) passing a reading knowledge examination in an approved foreign language; (2) satisfactorily completing six semester hours in statistics selected from Stat 105, 117, 118, 155, 187, 188; or (3) satisfactorily completing Stat 113 and 198 (computer programming).

Bachelor of Arts in Education with a teaching field in Geography—Prerequisite: the education curriculum, pages 113–14.

Required: the geography option and the professional courses listed on page 117.

Master of Arts in Education with a field in elementary or secondary education (specializing in geography)—Prerequisite: a bachelor's degree with sufficient concentration in geography to permit successful pursuit of graduate study in the Department of Geography and Regional Science. Candidates must be accepted by both the School of Education and Human Development and the Department of Geography and Regional Science.

Required: the general requirements, pages 125–27, including 15 semester hours of graduate courses in geography and regional science.

First Group

***26 Environmental Issues** (3) Staff

An interdisciplinary analysis of selected aspects of the population question, pollution and human health, urban environmental problems, issues of economic growth and development, technology and public policy. (Spring)

51 Introduction to Geography (3) Staff

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts. (Fall, spring, and summer)

52 Introduction to Economic Geography (3) Pederson

Examination of the basic principles which determine the location of economic activities. (Spring)

†91 East Asia—Past and Present (3) Johnson and Associated Faculty

An interdisciplinary course, introducing the student to a comprehensive and integrated understanding of the civilization and present problems of East Asia.

Second Group

104 Special Techniques in Cartography (3) Staff

Descriptive and statistical techniques for thematic mapping; computer cartography. Laboratory fee, $18. (Spring)

105 Scope and Methods of Geography (3) Pederson

Nature of geographical inquiry, approaches to the study of geography, empirical research methods. Admission by permission of instructor. (Spring)

106 Introduction to Remote Sensing (3) Staff

Examination of the principles and applications of remote sensing techniques using aerial photography and satellite imagery. Laboratory fee, $18. (Fall)

125 Transportation Geography (3) Lowe

Consideration of the spatial aspects of interaction, diffusion, and information transfer, including nodal activity and hierarchies, network geometry, gravity models, and diffusion processes. (Fall)

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* Offered jointly by the Division of Experimental Programs and the Biological Sciences and Geography and Regional Science Departments.

† An interdepartmental course offered by the Geography and Regional Science, East Asian Languages and Literatures, Economics, History, Philosophy, Political Science, and Religion Departments.

126 **Economic Geography** (3) Pederson
Theories concerning the location of economic activities. Exercises in locational analysis.

127 **Population and Settlement** (3) Gordon, Starsinic
Patterns of world population; factors contributing to population pressures, growth, and migrations. (Spring)

132 **Resource Management and Conservation** (3) Fitzsimmons
Principles and practices in effective utilization of resources in the United States and selected areas; public policies relating to conservation; environmental systems, perception, and impact studies. (Fall)

134 **Geography of Energy Resources** (3) Fitzsimmons
(Formerly Geography of Water Resources)
Analysis of regional patterns and trends in consumption and production of energy resources. Examination of international energy linkages and energy policies of selected nations. (Fall)

135 **Resources and Environmental Quality** (3) Fitzsimmons
Investigations into questions of resource use and environmental quality. Emphasis on public policy and societal attitudes as they influence man's use of resources. (Spring)

139 **Geographic Perspectives on Current World Problems** (3) Nystrom
Consideration of the impact of contemporary changes in national resources and populations on political communities. (Fall)

140 **Urban Geography** (3) Pederson
Analysis of the internal spatial structure of cities; emphasis on explaining patterns of location within the city. (Fall and summer)

141 **Urban Settlement** (3) Pederson
Distribution of urbanization on the surface of the earth; processes which lead to urbanization; theories which can be used to analyze the location of cities.

142 **Urban Environments** (3) Lowe
Consideration of the climatic, hydrological, and other selected aspects of the physical geography of the city, as well as of the nature, organization, and spatial patterns of urban delivery systems. (Spring)

143 **Social Geography** (3) Lowe
Consideration of behavioral aspects of geography incorporating spatial cognition, spatial behavior, social space, migration processes, and conflicts in spatial decision-making. (Fall)

144 **Environmental Adaptation** (3) Lowe
Relationship between people and their environment; emphasis on bioclimatological responses, disease ecology, nutritional demands, land capabilities, artificial environments, and environmental perception.

145 **Cultural Geography** (3) Staff
Analysis of the relationships between culture and environment; emphasis on spatial and ecological considerations.

146 **Political Geography** (3) Pederse
Analysis of the interrelationships between the political community and the human and physical environment. (Fall)

154 **Geography of the Middle East** (3)
(Summer)

161 **Latin America** (3) Gordo
Examination of spatial characteristics of physical and cultural phenomena in Middle and South America. (Fall)

164 **Geography of China** (3) Staf
Survey of the cultural and physical regional patterns of China.

189–90 **Readings in Geography** (arr.) Staf
(Academic year)

198 **Topics** (3) Staf
A consideration of geographic aspects of topical and future problems of society. Topics change each year. May be repeated for credit. (Spring)

Third Group

*215 **Field Methods in Cultural Ecology: Settlement Patterns in Pre-Columbian Mesoamerica** (3 or 6) Humphrey Langeba
Field and laboratory examination of settlement patterns and sociological structures in pre-Columbian Mesoamerica and their relationships to agricultural water-control systems.

221 **Seminar: Cultural Geography** (3) Fitzsimmons
Study of the noneconomic processes which affect the location of human activity. Topics to be discussed are environmental perception and evaluation, social definitions of space, and diffusion of innova tions. (Fall)

222 **Seminar: Resources and the Environment** (3) Fitzsimmons
Analysis of the spatial variations and interrelationships of resources and the environment.

223 **Seminar: The Population-Food Balance** (3) Gurdon
Analysis of spatial problems associated with the dynamics and interaction of population growth and agricultural output.

224 **Seminar: Political Geography** (3) Pederson
Examination of the political factor in location theory and analysis of the nature of political territories. (Spring)

225 **Seminar: Transportation Geography** (3) Lowe
Analysis of human spatial interaction; emphasis on networks, graph theory, gravity, interaction and potential models, migration models and diffusion processes. (Spring)

243 **Seminar: Urban Geography** (3) Lowe
Functional processes affecting the evolving morphology and interna

* An interdepartmental course offered by the Geography and Regional Science and Anthropology Departments.

spatial patterns of urban phenomena; emphasis on economic factors, behavioral considerations, and impact of time.

244 **Seminar: Urban Systems** (3) Pederson
Examination of central place theory and other theories of urban location.

261 **Seminar: Geography of Latin America** (3) Gordon
Selected topics related to population, environment, and land use in Latin America. (Fall)

265 **Seminar: Geography of the Soviet Union** (3) Baclawski
Physical features, economic geography, natural and energy resources, industries, transportation, agriculture, population trends; emphasis on population patterns along borderlands, especially the Sino-Soviet border. (Spring)

266 **Seminar: Geography of China** (3) True
Perspectives on environmental constraints to agricultural growth, adequacy of energy and mineral resources, types of developmental models; regional, physical, and cultural patterns and significance to contemporary problems and policies. (Fall)

287 **Seminar: Problems in Latin American Civilization** (3) Staff
Interdisciplinary seminar; each student writes a report on some aspect of a selected key theme. May be repeated for credit. Admission by permission of instructor. (Fall and spring)

*290 **Principles of Demography** (3) Staff
(Formerly Geog 280)
Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. (Fall)

*291 **Methods of Demographic Analysis** (3) Staff
(Formerly Geog 281)
Basic methods for analysis of mortality, natality, and migration; population estimates and projections; estimation of demographic measures from incomplete data. (Spring)

295 **Research** (arr.) Staff
May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

GEOLOGY

Professors G. Teleki *(Emeritus)*, G.V. Carroll, F.R. Siegel *(Chairman)*, A.G. Coates, R.C. Lindholm
Adjunct Professors J.W. Pierce, E.G. Kauffman, I.G. Sohn, M.A. Buzas
Professorial Lecturers N. Hotton, D. Appleman, I. Zietz
Associate Professor J.F. Lewis

* An interdepartmental course offered by the Departments of Economics, Geography and Regional Science, Sociology, and Statistics.

Associate Professorial Lecturers W.E. Maloney, A. Geiger, M.D. Turner
W. Back
Assistant Professorial Lecturers F.J. Collier, T.L. Hughes, E.T. Miller

Bachelor of Arts or Bachelor of Science with a major in Geology (Depar-mental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Required introductory course—Geol 21–22.
3. Required courses in related areas (a) Chem 11–12; (b) Math 30 (for th degree of Bachelor of Arts) or Math 30 and 31 (for the degree of Bachelor Science); (c) Stat 91; and (d) BiSc 11 or Phys 1 or 3 (for the degree Bachelor Arts); BiSc 11, *and* Phys 1 or 3 (for the degree Bachelor of Science).
4. Required courses in the major—Geol 111, 112, 117, 118, 122, 123, 151–52 f both the degree of Bachelor of Arts and Bachelor of Science; Geol 128, 166, 18 195 for the Bachelor of Science degree only.

Bachelor of Science with a major in Geology—Engineering option (Engineer-ing Geology) (Departmental)—An interdisciplinary curriculum offered by th Geology Department and the Civil, Mechanical, and Environmental Engineerin Department in the School of Engineering and Applied Science. (Students wish-ing to work toward the degree of Bachelor of Science [Civil Engineering] wit a geology option [geotechnical engineering] should consult the *School of Engi-neering and Applied Science Bulletin.)* The following requirements must b fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Required introductory courses—ApSc 57, 58, 113; Chem 13; EE 51; Geo 21–22; Math 31, 32, 33; Phys 14, 16; or equivalents.
3. Required courses in the major: CE 120, 140, 166, 167, 168, 182, 185; Geo 111–12, 117, 118, 122, 136, 189, 195, and one course chosen from Geol 128, 14 or 163; Math 111, 112; ME 126, 131; Stat 91 or 102 or ApSc 115.

Master of Science in the field of Geology—Prerequisite: the degree of Bachelo of Arts or Bachelor of Science with a major in geology from this University or an equivalent degree, and the Graduate Record Examination.

Required: the general requirements, pages 90–98. Master of Science degre candidates must include in their program of study Geol 141, 163 and 249 Geol 299–300 *Thesis Research* is required. Candidates must pass a Master's Comprehensive Examination before submitting their thesis work. A reading knowledge examination in French, Spanish, German, or Russian must b passed before beginning the thesis work or before beginning the third semester of graduate work; other languages may be taken with permission of the de partment. With the permission of the department, candidates in the Master of Science program may substitute another approved tool subject in lieu of th foreign language requirement.

Master of Science in the field of Geochemistry (an interdepartmental degre offered by the Departments of Geology and Chemistry)—Prerequisite: a Bache lor's degree with a major in geology or in chemistry from this University, a an equivalent degree.

Required: the general requirements, pages 90–98, including Chem 111–1 Geol 141, 241, 249; Chem 213; and Geol 299–300. The Master's Comprehensiv Examination must be taken before registration for the second half of the thesi work. A reading knowledge examination in a foreign language, approved by th Departments of Geology or Chemistry, must be passed prior to beginning th third semester of graduate work or before beginning the thesis work, whiche ever occurs first.

Master of Science in the field of Engineering Geology—An interdisciplinar degree offered by the Geology Department and the Civil, Mechanical, and E

vironmental Engineering Department in the School of Engineering and Applied Science.

Prerequisite: A Bachelor of Science degree in geology or a Bachelor of Science (Civil Engineering) degree from this University or an equivalent degree which must include those courses or their equivalents as outlined for the undergraduate requirements in the field of geology with the engineering option (engineering geology). With the permission of the department, a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis. (Students wishing to work toward a Master of Science in the field of geotechnics and foundation engineering should consult the *School of Engineering and Applied Science Bulletin.*)

Required: (a) The general requirements, pages 90–98; (b) geology—at least 12 semester hours to include Geol 128, 141, 163, and 205; (c) engineering and physical science—at least 12 semester hours to be selected from ApSc 211, 213; CE 204, 205, 206, 207, 208, 209, 216, 217, 218, 219, 221, 255, 256, 257, 263, 265, 271, 275, 276; ME 221, 227, 231, 261, 262; EngS 228.

Doctor of Philosophy in the field of Geology—Required: the general requirements, pages 90–92, 98–100, including passing a reading knowledge examination in an approved foreign language and one other approved tool subject; and the satisfactory completion of the General Examination in three fields, one of which must be in petrology, stratigraphy, or structural geology.

Research fields: geomorphology, marine geology, mineralogy, paleontology, petrology, sedimentology, stratigraphy, structural geology, and geochemistry.

Doctor of Philosophy in the field of Geochemistry (an interdepartmental degree offered by the Geology and Chemistry Departments)—Required: the general requirements, pages 90–92, 98–100, including passing a reading knowledge examination in an approved foreign language plus the satisfactory completion of Stat 117 and 118, or 91; and the satisfactory completion of the General Examination in four fields, including geochemistry and chemistry.

Bachelor of Arts in Education with a teaching field in Earth Science—Prerequisite: the education curriculum, pages 113–14.

Required: the earth science option and the professional courses listed on page 117.

First Group

1–2 Introductory Geology for Nonscience Majors (3–3) Staff

Lecture (2 hours), laboratory (2 hours). Survey covering the principles of geology; emphasis on human effect on the environment. Laboratory fee, $15 a semester. (Academic year)

5 Environmental Geology (3) Siegel and Staff

The relation of people and society to natural environment; population evolution and mineral resources; economic, legal, and political aspects. Laboratory fee, $15. (Fall and spring)

14 Mineralogy and Petrology for Nonscience Majors (3) Carroll

Lectures and laboratory. Prerequisite: Geol 1 and 2 or permission of instructor. (Spring)

21–22 Physical and Evolutionary Geology (3–3) Staff

Lecture and laboratory (5 hours). Principles of geology as a base for further study in geology and related sciences. Laboratory fee, $15 a semester. (Academic year)

Second Group

101 **History of Geological Sciences** (3) — Teleki
Development of scientific thought; history of geological and related sciences. (Spring)

105 **Geological Hazards in Land-Use Planning** (3) — Siegel
An analysis of geological hazards and related factors that affect land-use planning. Field trip. Prerequisite: Geol 5 or 21, or permission of professor. Laboratory fee, $10. (Spring)

111 **Mineralogy** (4) — Carroll
Lectures and laboratory. Morphological crystallography and systematic mineralogy. Prerequisite: Geol 1 or 21. Laboratory fee, $15. (Spring)

112 **Crystal Optics** (4) — Carroll
Lectures and laboratory. Optical phenomena of crystals and uses of the polarizing microscope. Prerequisite: Geol 111. Laboratory fee, $18. (Fall)

113 **Crystallography** (3) — Appleman
Point-group and space-group theory, fundamentals of crystal structure, x-ray diffraction theory and application. Prerequisite: Math 31. Laboratory fee, $15. Academic year 1978-79 and alternate years.

117 **Petrology** (2) — Lewis
Introduction to silicate phase systems; physics and chemistry of crustal and magmatic processes; volcanic processes and products. Prerequisite: Geol 21, 111–12; Phys 1 or equivalent; or permission of instructor. (Spring)

118 **Petrology Laboratory** (2) — Lewis
Concurrent registration in Geol 117 required for geology majors. Prerequisite: Geol 111. Laboratory fee, $18. (Spring)

122 **Structural Geology** (3) — Carroll
Interpretation of geologic formations on basis of their structures. Prerequisite: Geol 22. (Fall)

123 **Structural Geology Laboratory** (1) — Staff
Solution of geometrical problems of structural geology. Prerequisite or concurrent registration: Geol 122. Laboratory fee, $10. (Fall)

125 **Marine Geology** (3) — Pierce
Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. (Spring)

128 **Geomorphology** (3) — Staff
Lecture (2 hours), laboratory as arranged. Nature and evolution of earth forms; principles of photointerpretation. Prerequisite: Geol 21. Laboratory fee, $15. (Spring)

132 **Economic Geology** (3) — Turner
Genesis and distribution of mineral raw materials and their uses. Prerequisite: Geol 111. (Fall)

136 Engineering Geology (3) — Geiger

For students in the School of Engineering and Applied Science. Geological principles and processes and their application to civil and mechanical engineering. Prerequisite: Math 31, Phys 2 or 4; or permission of instructor. (Spring)

141 Introductory Geochemistry (3) — Siegel

Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisites or concurrent registration: Geol 117 or equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $5. (Fall)

151–52 Invertebrate Paleontology (3–3) — Coates, Collier

Lecture and laboratory (5 hours), field trips as arranged. A systematic treatment of the invertebrate fossil groups, emphasis on the macroinvertebrates. Prerequisite: Geol 1–2 or 21–22; or permission of instructor. Laboratory fee, $15 a semester. (Academic year)

154 Vertebrate Paleontology (3) — Hotton

Lecture (2 hours), laboratory or field work as arranged. General features of vertebrate morphology and evolution; problems of paleoecology and adaptation. Academic year 1979-80 and alternate years. (Fall)

158 Micropaleontology (3) — Sohn

Systematic and stratigraphic studies of important microbiota; subsurface methods. Special topics. May be repeated for credit with permission of instructor. Laboratory fee, $12. Academic year 1979-80 and alternate years. (Spring)

163 Sedimentation (4) — Lindholm

Lecture (2 hours), laboratory (4 hours), field trips as arranged. Principles of sedimentation, analysis and interpretation of sedimentary processes and environment, laboratory experiments in the properties of sedimentary particles. Prerequisite: Geol 111 or permission of instructor. Laboratory fee, $15. (Fall)

166 Principles of Stratigraphy (3) — Coates, Kauffman

Stratigraphic principles and methods. Prerequisite: Geol 151 or permission of instructor. (Fall)

175 Hydrogeology (3) — Back

The occurrence, storage, movement, quality, and problems of pollution of subsurface water, and the hydrologic properties of water-bearing materials. Prerequisites: Geology 111, 122; Math 31; Chem 11–12; or permission of instructor. (Spring)

181 General Oceanography (3) — Maloney

Chemical and physical properties of sea water, movements of water masses, meteorological interrelations, ecology of marine plants and animals. Prerequisite: Math 31 or equivalent, or permission of instructor. (Spring)

189 Geophysics for Geologists (3) — Zietz

Basic geophysics to assist the geologist mapping and solving geologic problems. Prerequisite: Geol 21-22, Math 31, Phys 1 or 3; or permission of instructor. (Fall)

195 **Field Work** (2) — Staff
Weekend field trips. Surveying, geological mapping, and specific field work methods. (Spring)

199 **Undergraduate Research or Reading** (arr.) — Staff
Problems approved by the staff. May be repeated once for credit. (Fall and spring)

Third Group

205 **Seminar in Geology** (2) — Staff
(Formerly 3 credits)
Special topics each semester. May be repeated for credit.

216 **Sedimentary Petrography** (3) — Lindholm
Identification, classification, and interpretation of common sedimentary rocks by means of the petrographic microscope. Prerequisite: Geol 111, 163; or permission of instructor. Laboratory fee, $15. (Spring)

219 **Petrogenesis I** (3) — Lewis
The origin of selected igneous and metamorphic rock types. Laboratory fee, $15. (Fall)

220 **Petrogenesis II** (3) — Lewis
Laboratory fee, $15. (Spring)

224 **Advanced Structural Geology** (3) — Lewis
Rock deformation. Methods of study and the formation of structurally complex rock. Tectonics. Prerequisite: Geol 122 or permission of instructor. (Fall)

241 **Geochemistry** (3) — Siegel
Chemical composition and physical properties of sea water, chemical composition and alterations of marine sediments, thermodynamics and biochemical activity in oceans. Methods of analysis and problems of measuring. Prerequisite: Geol 141, Math 31, and permission of instructor. Recommended: Chem 22. Laboratory fee, $18. (Spring)

243 **Geochemical Prospecting** (3) — Siegel
Application of geochemical principles and analyses to the detection of hidden ore deposits. Field trips as arranged. Prerequisite: Geology 141. Laboratory fee, $15. (Spring)

249 **Seminar: Geochemistry** (2) — Siegel
Independent topics each semester; may be repeated for credit. (Fall or spring)

253 **Paleoecology, Biogeography and Paleoclimatology** (3) — Coates, Kauffman
(Formerly Bioassociational Studies in Paleontology)
Concepts and methods in identifying bioassociations and their environments. Academic year 1978–79 and alternate years. (Fall)

254 Evolutionary Paleobiology (3) Kauffman
(Formerly Interpretive Paleontology)
Consideration of modern evolutionary theory with emphasis on the fossil record. (Spring)

255 Quantitative Paleoecology (3) Buzas
(Formerly Population Paleoecology)
Characteristics of populations applicable to the fossil record. Subject matter includes ecosystem concept, habitat, Hutchinsonian niche, life-death, size-frequency distributions, competitive exclusion principle, spatial distributions, relative abundance and diversity, quantification of community biofacies. Prerequisite: Geol 151–52, Stat 91; or permission of instructor. Academic year 1979–80 and alternate years. (Fall)

258 Micropaleontology (3) Sohn and Staff
Systematic studies of important microbiota. Prerequisite: Geol 158 or permission of instructor. Academic year 1978–79 and alternate years. (Fall)

263 Sedimentary Environments (3) Lindholm
Study of selected depositional environments. Field trips as arranged. Prerequisites: Geol 163; Stat 91. (Fall)

266 Stratigraphy (3) Coates, Kauffman
Problems in physical and biological stratigraphy. Analysis of major facies types. Academic year 1979–80 and alternate years. (Spring)

272 Regional Geology (2) Staff

295 Research (arr.) Staff
Research on problems approved by the staff. Open to qualified students with advanced training. May be repeated for credit. (Fall and spring)

299–300 Thesis Research (3–3) Staff
(Fall and spring)

Fourth Group

398 Advanced Reading and Research (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

GERMANIC LANGUAGES AND LITERATURES

Professors J.C. King, K. Thoenelt, C. Steiner *(Chairman)*
Associate Professorial Lecturer M.B. Guenther
Assistant Professorial Lecturer P. Werres
Instructor B.K. Netland
Lecturer A.G. Martin

Bachelor of Arts with a major in Germanic languages and literatures (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Ger 1–2, 3–4, 9–10, 51–52; or equivalent.
3. Required courses in other areas—six semester hours of history, and six semester hours in one of the following subjects: art history, music history, or philosophy.
4. Requirements for the major—a minimum of 24 semester hours in German courses above the first group, including Ger 179–80; reasonable proficiency in speaking, reading, and writing German.

Master of Arts in the field of Germanic languages and literatures—Prerequisite: a Bachelor of Arts degree with a major in Germanic languages and literatures from this University, or an equivalent degree.

Required: the general requirements, pages 90–98, including a reading knowledge of French. The program of study consists of (1) 24 semester hours of approved course work plus a thesis (equivalent to six semester hours) in the field of German literature or linguistics or, with departmental approval, (2) 30 semester hours of approval course work without a thesis.

Bachelor of Arts in Education with a teaching field in German—Prerequisite: the education curriculum, pages 113–14.

Required: the German option and the professional courses listed on page 117.

The Germanic Languages and Literatures Department, through the Consortium of Universities of the Washington Metropolitan Area, Inc., cooperates in a program leading to the degree of Doctor of Philosophy at Georgetown University.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

GERMAN

First Group

1–2 First-year German (3–3) Staff

Fundamental concepts of German culture; essentials of German structure and basic vocabulary; reading of easy prose and conversation. Aural-oral practice in language laboratory. Laboratory fee, $17.50 per semester. Prerequisite to Ger 2: Ger 1. (Fall and spring)

***3–4 Second-year German** (3–3) Staff

Introduction to German civilization; selections from modern German prose; continuation and review of German structure; conversation and simple composition. Aural-oral practice in language laboratory. Laboratory fee, $17.50 per semester. Prerequisite to Ger 3: Ger 1–2 or equivalent. Prerequisite to Ger 4: Ger 3. (Fall and spring)

***9–10 German Conversation and Composition** (3–3) Guenther

(Academic year)

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* With permission of instructor, Ger 9 or 10 may be taken concurrently with Ger 4.

47 Beginning German for Reading Acquisition (3) Staff

For undergraduates and graduate students with little or no German who are interested in acquiring a reading knowledge of German. No academic credit for graduate students. (Fall)

49 German Readings for Nonmajor Students (3) Staff

Primarily for graduate students preparing for reading examinations, undergraduates admitted. No academic credit for graduate students. Prerequisite: Ger 4 or 47, or equivalent. (Spring)

51–52 Introduction to German Literature—in English (3–3) Guenther

Lecture, recitation, and discussion. Selected readings in German literature from the earliest periods to the present. (Academic year)

Second Group

103–4 Major Themes of German Literature—in English (3–3) Thoenelt

Lecture and discussion. Topics for 1978-79: Ger 103—the "Faust" theme in German thought and civilization, from Goethe to Thomas Mann; Ger 104—the anti-Faust movement in German thought and civilization. Central topics: Jean Jacques Rousseau's return to nature and progress; "Realpolitik" and the arts and letters; "Kultur" (self-realization), the "Bildungsroman" and technocracy. (Academic year 1978-79 and alternate years)

111–12 Comparative Studies in Germanic Literatures—in English (3–3) Thoenelt

Lecture and discussion. Topics for 1977-78: Ger 111—Absurdity and rebellion, loss and rediscovery of the self, changing Gestalt concepts, from Existentialism back to Enlightenment, selected works of Thomas Mann, Böll, Frisch, Hesse, Strindberg, Goethe and others. Ger 112—Why literature? What is literature? Views and perspectives on the "usefulness" and "uselessness" of literature in modern Western societies. From Plato to the 20th century. Selected works and excerpts from Plato, Aristotle, Horace, Shakespeare, Montaigne, Goethe, Schiller, Heine, Nietzsche, Thomas Mann, Sartre, Camus, Böll and others. (Academic year 1979-80 and alternate years)

126 France and Germany—in English (3) Thoenelt

Comparative study of two European ways of life as reflected and perpetuated by literature and philosophy. Relevant excerpts and documents from the 16th to the 20th century. (Summer)

131–32 18th-Century German Literature—in German (3–3) Thoenelt

Enlightenment, Storm and Stress, Classicism. Reading, lecture, and discussion. Central topic: *Geist und Tat*—or the 18th-century concept of literature's formative function in society. (Academic year 1979-80 and alternate years)

141–42 19th-Century German Literature—in German (3–3) Steiner

Romanticism, Biedermeier, young Germany, poetic realism. Second age of chivalry and *Sehnsucht*, revolution and counter-revolution in thought and literature. Birth and growth of modern nationalism and cosmopolitanism as reflected in the literature of the period. Reading, lecture and discussion. (Academic year 1978-79 and alternate years)

151–52 **20th-Century German Literature—in German** (3–3) Steiner
The age of Nietzsche, Naturalism, Impressionism, Expressionism; Kafka, Thomas Mann, Hesse; émigré literature, contemporary drama; authors of Gruppe 47. Reading, lecture, and discussion. (Academic year 1979-80 and alternate years)

161–62 **Studies in Modern German Literature—in English** (3–3) Steiner
Readings of representative writers of modern German prose; lecture and discussion in English. Offered as the demand requires.

179–80 **Advanced German Conversation and Composition** (3–3) Thoenelt
Discussions and compositions on literary and cultural topics, readings of newspaper articles, interpretations of selected texts (Gottfried Benn and Thomas Mann), grammar and style studies. (Academic year 1978–79 and alternate years)

Third Group

201–2 **Middle High German** (3–3) King
(Academic year 1979–80 and alternate years)

209–10 **German Expression and Style in Historical Perspective** (3–3) King
(Formerly Old High German)
(Academic year 1978–79 and alternate years)

211–12 **History of the German Language** (3–3) King
(Academic year 1978–79 and every third year)

213–14 **Old Norse** (3–3) Allee
(Academic year 1979–80 and alternate years)

225–26 **Seminar: Linguistics** (3–3) King, Allee
Bibliography, methodology, readings, and research problems. Offered as the demand requires.

231–32 **German Classicism** (3–3) Thoenelt
Advanced study and critique of the literature of the Goethe era. The 18th century image of man; literature and society; the regenerative function of aesthetics; and the establishment of criteria for "Kunst" and "Kitsch." (Academic year 1978–79 and alternate years)

251–52 **Seminar: Studies in 20th-Century German Literature** (3–3) Steiner
Special projects in fiction, drama, poetry, and criticism. Topic for 1978–79: *Das deutsche Drama der Gegenwart.* Analysis of *Weltanschauung* and themes in the major dramatic works of Brecht, Dürrenmatt, Frisch, Grass, Hochhuth, and Peter Weiss. (Academic year 1978–79 and alternate years)

271–72 **Seminar: German Realism** (3–3) Steiner
Analysis of authors, works, genres, and literary trends. (Academic year 1979–80 and alternate years)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

SANSKRIT

105–6 First-year Sanskrit (3–3) King

A year course: credit toward a degree at this University given on completion of Ger 106. Language, literature, and culture of ancient India. Essentials of grammar; reading of classical texts. Aural-oral practice in language laboratory. Laboratory fee, $17.50 per semester. (Academic year 1979–80 and alternate years)

107–8 Second-year Sanskrit (3–3) King

A year course: credit toward a degree at this University given on completion of Ger 108. Language, literature, and culture of ancient India. Continuation and review of grammar; reading of more difficult classical and Vedic texts. Aural-oral practice in language laboratory. Prerequisite: Ger 105–6 or equivalent. Laboratory fee, $17.50 per semester. (Academic year 1978–79 and alternate years)

SCANDINAVIAN

81–82 Beginning Scandinavian (3–3) Netland

Introduction to Norwegian and introductory reading approach to Danish. Fundamental concepts of Scandinavian civilization. Ger 81: Norwegian, language and structure; reading, conversation, and composition. Presentation of Scandinavian culture. Ger 82: additional reading, conversation, and composition in Norwegian. Reading approach to Danish. Credit will be given for each semester. Aural-oral practice in language laboratory. Laboratory fee, $17.50 per semester. Prerequisite to Ger 82: Ger 81 or equivalent. (Academic year)

83–84 Intermediate Scandinavian (3–3) Netland

Intermediate Norwegian; reading, conversation, and composition. Additional reading in Danish and Swedish. Outlines of modern Scandinavian culture, including a brief introduction to Icelandic. Students will select a special study project within the course framework. Credit will be given for each semester. Prerequisite to Ger 83: Ger 82 or equivalent. Prerequisite to Ger 84: Ger 83 or equivalent. (Academic year)

GREEK

See **Classics.**

HEALTH CARE ADMINISTRATION

Professors L. Gintzig (*Chairman*), M.C. Devolites, K.J. Darr, P.N. Reeves
Professorial Lecturer H.L. Hirsh
Associate Professors P.S. Birnbaum, R.G. Shouldice, R.R. Bonato (*Research*)
Adjunct Associate Professors W.J. Green, Jr., W.J. Auton
Associate Professorial Lecturers W.A. Parker, H.R. Wertlieb, C.C. Rorrie, G.E. Morris

Assistant Professor G.J. McHugh
Adjunct Assistant Professors C.V. Gordon, Jr., S.T. Fisher, J.J. Geer, N.C. Oglesby
Assistant Professorial Lecturers N.B. Hadley, O.L. Quintana, R.H. Hagama
Instructors D.F. Bergwall, C.P. McKelvey
Adjunct Instructors R.W. Black, J.E. Bruhn, M.S. Duny, R.A. Payton, W.L. Roach, Jr.

George Washington University offers undergraduate study leading to the degree of Bachelor of Science in Health Care Administration. The primary purpose of this bachelor's degree program is to provide students with a broad managerial education for mid-level administrative and planning positions in hospitals and related health organizations. At this time the degree program is limited to students in the Naval School of Hospital Administration at Bethesda, Maryland; for further information contact the chairman of the Health Care Administration Department.

Programs of study leading to the degrees of Master of Arts in Health Care Administration† and Post-masters Graduate Certificate in Health Care Administration, which provide preparation for professional practices in the health care services field, and areas of concentration in health care administration as study fields in programs leading to the degrees of Doctor of Business Administration and Doctor of Public Administration, are offered by the School of Government and Business Administration (see pages 133–64).

Second Group

Second-group courses marked with an asterisk (*) are limited to students in the Bachelor of Science in Health Care Administration degree program at the Naval School of Hospital Administration.

***108 Survey of Health Economics (3)** Rosch

Survey of the principles and applications of economic analysis in the health field. Economic criteria required for cost effectiveness, operations analysis and resources management.

***110 Introduction to Health Care Planning (3)** Black

Introduction to health care program and facility planning. Emphasis on the role and function of planning agencies, estimation of needs, assessment of community and facility resources, data collection and evaluation of program and facility design.

***120 Personnel Relations in Health Care Institutions (3)** Fisher

Introduction to personnel relations in the health care environment. Research studies, as they pertain to leadership and superior-subordinate relations in a multidisciplinary organization, are evaluated for practical application. Emphasis on employee cooperation, differences in ability and background, and particular problems caused by specific working conditions.

***130 Hospital Labor Relations (3)** Fisher

Brief history of unionism, characteristics of union organizations and union movements, and the basic reasons why the government became involved in employer-employee relations. Labor laws and National Labor Relations Board decisions as applied to health care

† Accredited by the Accrediting Commission on Education for Health Services Administration.

facilities. Management's role in the collective bargaining process and the administration of and "living" with collective bargaining agreements.

*140 **Hospital Financial and Material Management** (3) Duny

Principles, practices, functions and objectives of financial and material management of hospital operations; emphasis on the role and contributions of middle management. Costs and budgetary control, responsibility accounting, cost-based budgets, purchasing, inventory control, distribution and storage.

142 **Financial Management in Health Care Institutions** (3) Duny

Consideration of the nature, analysis and interpretation of accounting data. Cost accounting, budgeting and internal control techniques, emphasis on their use in the management planning and control process.

153 **Survey of Health Care Organization** (3) Parker, Roach

Introduction to the organization and delivery of health care services in the U.S. Emphasis on the structural features of and the resources available to the health care system. (Fall and spring)

154 **Introduction to Hospital Management and Procedures** (3) Parker, Black

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager. (Fall and spring)

*155 **Special Problems in Health Care Management** (3) Oglesby

Supervised reading program in which the student is expected to review the literature on a middle-management problem present in contemporary American health care institutions.

*159 **Legal Issues in Health Care Administration** (3) Geer

Recognition and comprehension of areas of legal liability in hospital activities. Knowledge and understanding of a wide variety of administrative duties and responsibilities of a legal nature, such as administrative investigations, misconduct and line-of-duty determinations, administrative discipline and discharge, claims under the Medical Care Recovery Act, Federal Tort Claims Act, and other related matters.

*162 **Introduction to Hospital Information Systems** (3) Payton

Development and discussion of a computerized integrated information system, its effect on the environment and its use within the organizational system for planning and control. Analysis of actual information systems used in hospitals.

170 **Quantitative Methods in Health Care Administration** (3) Gordon

Application of quantitative methods to the health services industry. Fundamental statistical techniques enabling the student to read, comprehend, critically appraise and intelligently utilize the growing volume of quantitative research appearing in the health services literature. Familiarization with quantitative procedures applied to analyzing management problems in the operational environment. Emphasis on establishing a fundamental understanding of statistical ideas rather than upon manipulating predeveloped formulas.

*180 **Management Case Problems in Hospital Administration** (3) Bruhn, Oglesby

Management functions in the hospital setting. Management case problems in hospital administration areas such as authority relationships, communication barriers, motivation and productivity, and control techniques discussed and analyzed.

190 **Special Topics in Health Care Administration** (3)

Experimental offering at the undergraduate level. (Fall and spring

Third Group

202 **Introduction to Health Care Systems** (3) McKelvey, Reeves

Lecture and discussion (2 hours), laboratory (2 hours). Introductory description and analysis of the American health and medical care systems. Organization, characteristics and relationships of research, technology, manpower, public and private delivery, and financing mechanisms. Survey of major disease problems and their impact on administration and planning. Medical terminology. (Fall and spring)

203 **Organization and Management of Health Care Institutions** (3) Darr, Hadley, McHugh, Hagaman

Lecture and discussion (2 hours), laboratory (2 hours). History and current character of institutional providers of health care. Function, organizational structure and interrelationships of various types of health care facilities. Institutional ethics; statistics. Regulation of institutional providers. (Fall and spring)

204 **Management of Health Maintenance Organizations** (3) Shouldice

Basic principles and fundamentals of prepaid group practice plans and newly forming health maintenance organizations. Emphasis on planning, development and operation of prepaid plans. (Fall and spring)

205 **Hospital Administrative Practices** (3) McHugh, Darr

Lecture and discussion (2 hours), laboratory (2 hours). Organization, management and interrelationships of hospital clinical, support and administrative departments. Analyses of procedures and systems. Hospital personnel administration. Administrative ethics. Requirements of the Joint Commission on Accreditation of Hospitals. Prerequisite: HCA 203. (Fall and spring)

206 **Case Studies in Health Care Administration** (3) Devolites, Birnbaum, McHugh

Discussion (2 hours), laboratory (2 hours). Intensive qualitative and quantitative analyses of major problem areas in health care administration using the case study method. Cases cover the broad spectrum of health care delivery and management: plans and operations, personnel, financial and materiel. Developing and implementing solutions. Serves as capstone course for health care administration students. Prerequisite: HCA 202, 203 and Mgt 201. (Fall and spring)

207 **Management Analysis in Health Care Institutions** (3) Shouldice, Bergwall, Reeves

Lecture (2 hours), laboratory (2 hours). Basic investigation and

problem-solving techniques, including various methods of collecting, analyzing, reporting and using information that can be made available to administrators of hospitals and other medical care institutions. Field assignments. (Fall and spring)

209 **Health Resources Management** (3) Devolites, Birnbaum, Quintana

Lecture (2 hours), laboratory (2 hours). Introduction to resource analysis, financial management and health economics/statistics of health care institutions. Estimates of health services demand and resource requirements. Preparation of budgets, financial statements and reports. Financial analysis. Public and private health insurance. Management of medical facilities and material. Regulation and containment of costs. Safeguarding hospital assets. (Fall and spring)

210 **Advanced Health Resources Management** (3) Devolites

Development of financial health policies, objectives and programs. Application of PPBS in the health care field; financial management of multi-unit health care systems; financial aspects of national health programs, prospective rates and regulation of health prices; case studies and field research. (Fall or spring)

211 **Quantitative Methods in Health Service Operations** (3) Devolites, Shouldice

Concepts and application of quantitative methods in health service operations, involving demand analysis and forecasting, resource allocation, and quality and productivity control. (Fall and spring)

212 **Introduction to Health Planning** (3) Reeves, Bergwall

Lecture (2 hours), laboratory (2 hours). Introduction to the history and development of health planning in the United States. Presentation of basic health planning methods and procedures at a project level. (Fall and spring)

213 **Comparative Health Care Systems** (3) Gintzig

Comparative evaluations of various organizational patterns, functions and trends in international health care delivery systems. Emphasis on the sources of such differences and significance of the systems to the health care of a nation. Primarily for doctoral candidates; open to other students by special arrangement with the department. (Fall and spring)

214 **Health Systems Planning** (3) Reeves, Bergwall

Advanced planning techniques emphasizing quantative and rational methodology at the health systems level. In-depth discussion of selected critical components of the health planning process. Prerequisite: HCA 212, or permission of instructor. (Fall or spring)

216 **Seminar: Policy in Health Planning** (3) Reeves

Analysis of the legal, political, social and economic factors in health care planning, with emphasis on policy formulation and implementation. Explores the role of societal values in setting health policy. Prerequisite: HCA 212, or permission of instructor. (Fall or spring)

250 **Delivery of Mental Health Services** (3) Morris

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management and financial support of treatment and rehabilitation facilities. (Fall and spring)

260 **Introduction to Long-term Care Administration** (3) Wertlieb
Evolution of long-term institutions as a health care delivery sub-system. Comparative evaluation of characteristics of various long-term care institutions; regulation by government. Relationships between the purposes and functions of these institutions and the health care needs of the community are investigated. (Fall)

261 **Seminar: Managing the Long-term Care Institution** (3) Wertlieb
Designed to improve the abilities and effectiveness of health care administrators through a foundation of knowledge and skills in long-term health care facility organization and management. Emphasis on the range of services available in long-term care institutions. Prerequisite: HCA 260 or permission of instructor. (Spring)

†267 **Issues in Aging** (3) Reeves
The nature and problems of aging including the social, psychological, biological, economic, legal and health care needs and services of the older population. Designed primarily for graduate students in social sciences, health care administration, and for students in the medical school. Open to other students with consent of instructor. (Fall and spring)

270 **Research in Health Care Administration** (3) Gintzig, Reeves
Field research. Primarily for doctoral students; open to other graduate students with consent of instructor. May be repeated for credit. (Fall and spring)

285–86 **Readings in Health Care Administration** (3–3) Gintzig and Staff
Supervised readings in special areas of health care administration and planning. Primarily for doctoral students; open to other students by arrangement. May be repeated for credit. (Academic year)

287 **Health Care Administration and the Law** (3) Hirsh
Primarily for doctoral students; open to other students by arrangement. Legal duties and responsibilities, as well as rights of administrators and the health care facility, are outlined. Discussion of the legal relationships of facility personnel, legal aspects of labor relations and trends in hospital law. (Fall and spring)

288 **Field Problem Studies in Health Care Administration** (3) Gintzig, Reeves
Selected administrative and planning issues and problems arising in health care facilities. Primarily for doctoral students; open to other students by arrangement. May be repeated for credit. (Fall and spring)

290 **Special Topics in Health Care Administration** (3) Staff
Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

293-94-95 **Residency I** (3–3–3) Staff
Twelve-month residency, beginning summer, fall or spring. Work experience under a qualified preceptor, periodic written progress reports, a written major report or a selected field project.

† An interdisciplinary seminar jointly sponsored by the Departments of Health Care Sciences and Health Care Administration.

296-97-98 **Residency II** (3–3–3) Gintzig
For selected students who take a second 12-month residency; begins summer, fall or spring.

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

Fourth-group courses are limited to doctoral students, and are offered as the demand requires.

311–12 **Seminar: Public-Private Sector Institutions and Relationships** (3–3)

398 **Advanced Reading and Research** (arr.) Staff
Limited to doctoral students preparing for the general examinations. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to doctoral candidates. May be repeated for credit. (Fall and spring)

HEBREW

See **Classics.**

HISTORY

Professors R.H. Davison, R.B. Thompson, R.C. Haskett, R.P. Sharkey, H.M. Sachar, R.W. Kenny, P.P. Hill *(Chairman)*, L.G. DePauw, R. Thornton, L.G. Schwoerer
Adjunct Professor R.P. Multhauf
Associate Professors C.J. Herber, W.R. Johnson, R.A. Hadley, P.F. Klarén, A.D. Andrews, R.E. Kennedy, Jr., J.O. Horton
Adjunct Associate Professor A.L.K. Nelson
Associate Professorial Lecturer J.H. Moran
Assistant Professor L.P. Ribuffo

Bachelor of Arts with a major in history (field-of-study or departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the Humanities and the Natural and Mathematical Sciences.)

2. Required introductory courses—Hist 39–40, 71–72, or equivalent. Majors may waive one or more of the prerequisite courses by passing departmental examinations, by attaining scores of 600 or above on the College Entrance Examination Board Achievement Tests, or by good performance on Advanced Placement Examinations. Credit for one or more of the prerequisite courses may be received by superior performance on departmental or Advanced Placement Tests.

3. Required courses in related areas—(a) either 12 semester hours of an approved foreign language or (b) nine semester hours in statistics (Stat 53, 105, and 97).

4. (a) *Field-of-study major*—Hist 199 (Proseminar), six semester hours of third-group courses, including at least three semester hours of research seminar, and the passing of the major examination in the senior year. In planning a program, the student, under the guidance of an advisor, should choose courses which will provide a broad understanding of diverse chronological and geographical aspects of the human experience.

(b) *Departmental major*—27 or more hours of second- and third-group courses, including Hist 199, six semester hours of third-group courses, including at least one research seminar, and six semester hours chosen from each of the following fields: I (Europe)—Hist 101, 105, 106, 109, 110, 111, 112, 121, 122, 123, 124, 127, 131, 132, 139, 140, 141, 142, 147, 148, 149, 150, 151, 152, 153, 154, 156, 157, 198; II (United States)—Hist 128, 129, 167, 169, 170, 171, 172, 173, 174, 175, 176, 177, 178, 179, 180, 181, 182, 183, 184, 185, 186, 197; III (Russia, Asia, Africa, and Latin America)—Hist 102, 108, 113, 114, 116, 119, 137, 138, 143, 144, 145, 146, 158, 161, 163, 164, 166, 187, 188, 189, 193, 194, 195, 196.

A pamphlet relating to the major is available in the offices of the dean of the Columbian College of Arts and Sciences and in the History Department.

An Honors Program may be chosen by juniors with satisfactory scholastic records. Application to this program must be made before the beginning of the second semester of the junior year. Students accepted into the program take a three-hour seminar in the second semester of the junior year and complete the research requirements for the history major by preparing the Senior Honors Thesis (Hist 191–92) in the final year of undergraduate study.

Master of Arts in the field of classical archeology, classics, and history (an interdepartmental degree program offered by the Art, Classics, and History Departments)—Prerequisite: a bachelor's degree with a background in classics, archeology and either Greek or Latin. Applicants from other institutions must present scores on the Graduate Record Examination to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–98. The program of study consists of 24 semester hours of course work (as many as possible should be third-group courses) selected in consultation with the appropriate advisor from the Art, Classics, and History Departments; plus a thesis (equivalent to six additional semester hours). Candidates must pass a reading knowledge examination in French or German. All candidates are required to pass a general Master's Comprehensive Examination.

Master of Arts in the field of history—Prerequisite: a bachelor's degree from an accredited college or university with a major in history, or an equivalent degree; high scholastic standing; and approval of the department. Applicants from other institutions must present scores on the Graduate Record Examination with the Advanced Test in History and arrange for four persons, preferably former instructors, to send letters or reference forms to the Office of the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–98. The program of study consists of (1) a minimum of 30 semester hours of second- and third-group courses, including Hist 299–300 *Thesis Research*, or (2) a minimum of 36 semester hours of second- and third-group courses, including at least two research seminars (six semester hours). At least six semester hours of each candidate's program must be in third- or fourth-group history courses; a maximum of six may be in approved courses outside the History Department. To receive graduate credit, master's candidates must arrange for extra work with the instructors in order to receive graduate credit for such courses. Each student works in two fields of history and is required to pass a Comprehensive Examination in each.

Doctor of Philosophy in the field of history—Required: the general require

ments, pages 90–92, 98–100, including the passing of a written examination in two appropriate foreign languages, or one foreign language and an approved tool subject, and the satisfactory completion of the General Examination in four fields. Normally, each doctoral candidate will work in one major (or general) field of study and three special fields. The major fields include the following: ancient history, medieval Europe, early modern Europe, modern Europe, United States, Latin America, modern Near East, modern Far East, Russia and East Europe. Special fields may vary from the topical (e.g., U.S. social history, European intellectual history, etc.) to the chronologically limited fields (e.g., American colonial history, Tudor and Stuart England, etc.). A student may elect one special field outside of the History Department if it is relevant to the program.

Doctor of Philosophy in the field of international relations—See page 359. This degree program combines work in economics, history, and political science.

Bachelor of Arts in Education with a teaching field in history—Prerequisite: the education curriculum, pages 113–14.
Required: the history option and the professional courses on page 117.

Course Accessibility: All second-group courses are open to students without history course prerequisites with the exception of Hist 157 and 199.

First Group

39–40 European Civilization in Its World Context (3–3) **Staff**

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present. (Academic year)

71–72 Introduction to American History (3–3) **Staff**

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from the beginning to 1876. Hist 72: from 1876 to present. (Academic year)

*91 **East Asia—Past and Present** (3) Johnson and Associated Faculty

An interdisciplinary course, introducing the student to a comprehensive and integrated understanding of the civilization and present problems of East Asia.

Second Group

101–2 History of Revolution (3–3) **Thompson**

Hist 101: revolution as a theme in world history from ancient times to Luther, Cromwell, and Robespierre. Hist 102: revolution and the revolutionary movement in the age of Marx, Lenin, and Mao. (Academic year)

105–6 History of Science (3–3) **Multhauf**

(Formerly History of Science and Technology)

Hist 105: from ancient natural philosophy through the 17th-century scientific revolution. Hist 106: from the Industrial Revolution to the 20th-century amalgamation of science and technology. (Academic year)

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* An interdepartmental course offered by the History, East Asian Languages and Literatures, Economics, Geography and Regional Science, Philosophy, Political Science, and Religion Departments.

108 The Ancient Near East and Egypt to 322 B.C. (3) Had
Survey of Egyptian, Mesopotamian, Anatolian, West Semitic, Iranian civilizations from the Neolithic period to Alexander's quest.

109 Early Aegean and Greek Civilizations to 338 B.C. (3) Had
Neolithic background: Bronze age—Minoan, Helladic, and Mycena civilizations; classical Greek civilization to the Macedonian conqu (Fall)

110 The Roman World to 337 A.D. (3) Had
Prehistoric Italy; rise and decline of the Roman Empire and L civilization; cultural, social, and political developments in the G world under Roman rule. (Spring)

111–12 Medieval History (3–3) Andr
Hist. 111: Failure of the old Roman Empire, formation of barba kingdoms in the West and their evolution to about 1000 A Byzantium and Islam at their apogee. Hist. 112: Medieval Europ daily life, institutions, and creative movements to about 1400; Crusades and the Near East to the rise of the Ottoman Tu (Academic year)

116 History of Africa (3)
Survey of political, cultural, and economic development from anc times to the present. (Spring)

119 China in the 20th Century: Reform and Revolution (3) John
Origins, goals, substance, and significance of political, social, intellectual upheavals in China from 1900 to the present. (Summ

121 The Renaissance in Western Europe (3) Schwo
Political, socioeconomic, intellectual, and cultural developments, the 14th to 16th centuries, with emphasis upon Italian city- (Fall)

122 The Reformation in Western Europe (3) Heir
Religious, political, and social consequences of the theological t heavals of the 16th century. (Spring)

123–24 European Intellectual History (3–3) Kenne
Philosophy, political, and economic thought, cultural developme popular culture, diffusion of ideas. Hist 123: 17th and 18th centur Hist 124: 19th and 20th centuries. (Academic year)

125 Women in European History (3) St
A study of the role of women in the political, social, intellectual, economic life of Europe from the Middle Ages to the 20th centu (Fall)

***127 Theories of History** (3) Lav
Major philosophies of history: Judeo-Christian, idea of progress, toricism, Hegelian-Marxist dialectic, cyclical (Vico, Spengler, To bee), and social-scientific (Kant, Weber) views. Contempor problems of historical knowledge. (Fall)

* An interdepartmental course offered by the History and Philosophy Departments.

128–29 **War and Society** (3) — McDonald

How wars, armed forces, and defense policies have affected British and American politics and society. Special attention to the relationship of defense and foreign policy, civil and military relations, the development of strategic thought, and the naval/military influences Britain and America have exerted on each other. Hist 128: from 1776 to 1918. Hist 129: 1919 to the present. (Academic year)

131–32 **History of Germany** (3–3) — Herber

Political, social, and cultural development. Hist 131: from mid-17th century to Bismarck. Hist 132: from William II to the present. (Academic year)

136 **Europe in the 20th Century** (3) — Sachar

Diplomatic, political, and cultural developments from the turn of the century to the present. (Summer)

137 **U.S.-Soviet Strategic Relations Since World War II** (3) — Thornton

Survey of U.S.-Soviet global rivalry from World War II to the present; comparative historical assessment of the changing strategic balance. (Spring)

138 **History of World Communism** (3) — Thornton

The international communist movement from its beginnings to the present.

139–40 **World History in the 20th Century** (3–3) — Sachar

Diplomatic, political, and cultural factors. Hist 139: from the turn of the century to the Munich settlement of 1938. Hist 140: from the Munich settlement to the present. (Academic year)

141–42 **History of France** (3–3) — Kennedy

Political, social, and cultural development. Hist 141: Old Regime, French Revolution, and Napoleon. Hist 142: from Napoleon to present. (Academic year)

143 **Europe East of the Elbe, 1815-1939** (3) — Staff

Poland, the Danube countries, and the Balkans in the 19th and 20th centuries. (Fall)

144 **Medieval Russia** (3) — Staff

Russian history from its beginnings to the reign of Peter the Great. (Spring)

145 **Imperial Russia** (3) — Thompson

From the reign of Peter the Great to World War I. (Fall)

146 **Soviet Russia** (3) — Thompson

The Russian Revolution and Soviet rule to the present. (Spring)

*147 **Economic History of Modern Europe** (3) — Sharkey

Economic development since the Middle Ages; emphasis on the period following the Industrial Revolution. Evolution of capitalism and its impact upon the societies of Europe. (Spring)

* An interdepartmental course offered by the History and Economics Departments.

148 **The French Revolution** (3) Kennedy
Social, political, economic, and cultural history of the decade of revolution, 1789–1799. Attention to its structural consequences in France and in Europe-at-large. (Summer)

149–50 **European Diplomatic History** (3–3) Davison
Emphasis on policies and actions of the great powers and their statesmen. Issues of war and peace, international crises, nationalism, alliances, and tensions. Hist 149: 1812 to 1890. Hist 150: since 18[illegible] Students who receive credit for Hist 150 cannot receive credit for Hist 157. (Academic year)

151–52 **History of England** (3–3) Kenny
Development of English civilization and its impact on Western culture. Hist 151: to 1689. Hist 152: since 1689. (Academic year)

153 **Tudor England** (3) Kenny
Aspects of the constitutional, social, intellectual, economic, and religious development of England, 1485-1603.

154 **Stuart England** (3) Schwoerer
Grand Rebellion, Restoration, and Glorious Revolution. The political, religious, socioeconomic, and intellectual developments in England, 1603–1714. (Spring)

156 **Winston Churchill as War Leader** (3) McDonald
Churchill's role—from cavalry subaltern to prime minister—in the British Empire's wars during his lifetime, with special attention to the two world wars. (Summer)

157 **20th-Century European Diplomatic History** (3) Sachar
The main currents, with necessary 19th-century background. Students who receive credit for Hist 157 cannot receive credit for Hist 150. (Fall)

158 **Modern Jewish History** (3) Sachar
A secular history of the Jewish people from the 18th century to the present state of Israel; emphasis on European political, economic and cultural influences. (Spring)

161 **The Revolutionary Tradition in Latin American History** (3) Klarén
(Formerly Revolution in 20th Century Latin America: the Mexican and Cuban Experience)
An examination of the main social revolutions from colonial times to the present; their origins, social composition, leadership, and ideology. (Spring)

163–64 **History of Latin America** (3–3) Klarén
Hist 163: Analysis of Spanish and Portuguese imperialism in the New World, 1492-1820. Hist 164: a problems approach to Latin America, 1820 to the present; thematic emphasis on neo-colonialism, corporatism, liberalism, caudillismo, modernization, populism, and revolution. (Academic year)

165 **Latin American Responses to the Industrial World, 1820-1945** (3) — Klarén
(Formerly History of Brazil)
Examination of the political/diplomatic responses of Latin American nations, individually and collectively, to the expanding industrial powers of the Northern hemisphere in the 19th and 20th centuries. (Fall)

166 **History of Mexico** (3) — Klarén
Focus on Aztec imperialism, the Indian view of the Conquest, landlord/peasant relations, the struggle for independence, the Revolution of 1910; race, caste and class in modern Mexico; the role of the modern Mexican state. (Fall, alternate years)

167 **Man-made America: the Colonial Scene** (3) — Haskett
The setting and shape of life in early America. (Spring)

169 **The American Revolution** (3) — DePauw
The political, intellectual, social, military, and economic impact of the events surrounding the separation of the United States from the British Empire. Special attention to the influence of non-elite groups. (Fall)

170 **U.S. Early National History** (3) — Hill
Political, diplomatic, economic, and social history of the early republic, 1789–1828. (Fall)

171–72 **U.S. Social History** (3–3) — Horton
Hist 171: daily life, institutions, intellectual and artistic achievements of the Agrarian Era, 1607–1861. Hist 172: the Urban-Industrial Era from 1861 to present.

173–74 **Afro-American History** (3–3) — Horton
The role of black Americans in United States history. (Academic year)

175–76 **U.S. Political History** (3–3) — Haskett
Hist 175: to the Civil War. Hist 176: Civil War to 1960. (Academic year)

177 **The Ante-bellum South** (3) — DePauw
Investigation of political, economic, intellectual, social, and cultural characteristics of the American South prior to 1860. Special attention to myths associated with the South, ideologies supporting the slave system, and cultural practices among the white, black, and Indian populations. (Spring)

178 **Recent U.S. History** (3) — Ribuffo
Political, social, and intellectual history from 1890 to the present. (Fall)

*179–80 **U.S. Economic History** (3–3) — Sharkey
Economic growth from colonial times to the present. Development of various sectors in the economy and their interdependence. Hist 179: 1607–1865. Hist 180: from 1865 to the present. (Academic year)

* An interdepartmental course offered by the History and Economics Departments.

181–82 U.S. Diplomatic History (3–3)
American foreign relations from the era of the American Revolution
Hist 181: to 1898. Hist 182: 20th century. (Academic year)

183 American Intellectual History (3)
Aspects of social and political theory, religious thought, literary cri
cism, and popular psychology from the late 19th century to th
present. (Summer)

184 American Secretaries of State (3)
(Formerly American Secretaries of State in the 19th Century)
Biographical approach to U.S. diplomatic history. Emphasizes impa
of individual secretaries and their relations to the presidents. Rea
ings and discussions. (Summer)

185 History of Women in America (3)
Survey of the political, economic, social, military, religious, inte
lectual, and cultural practices in North America from 1000 A.D.
the present as these have affected and been affected by the fema
half of the population. (Spring)

186 U.S. Urban History (3)
The American city from colonial foundations to the present, relatin
social and economic forces to physical form. Special emphasis o
transitions from pre-industrial to industrial to metropolitan form
focusing on implications for public policy and historic preservatio
Same as AmCv 186. (Fall)

187 History of Modern China (3)
China since 1840, particular attention to political development
(Fall)

188 History of Chinese Communism (3)
Survey of the leadership, ideology, structure, and foreign and do
mestic policies of the Chinese Communist Party from its incepti
the present. (Fall)

189 History of Modern Japan (3)
Japan's century of modernization—from the Meiji Restoration
1868 to the present. Emphasis on historical, political, economic, an
cultural factors. (Fall)

191–92 Senior Honors Thesis (3–3)
Required of and open only to undergraduate honors candidates
history. (Academic year)

193 History of the Near East (3)
Byzantine, Arab, Persian, and Islamic backgrounds; rise and decli
of the Ottoman Empire; action of European powers in the area; Ot
man breakup into the Turkish Republic and other states. (F
even years)

194 History of the Modern Near East (3)
Beginning with Napoleon's invasion of Egypt. Development of
tionalism and of modern states; impact of the West on culture a
institutions; great-power imperialism; crises of Turkish Straits, Su
Arab-Israeli relations; and other issues. (Fall, odd years)

195–96 **History of East Asia** (3–3) Johnson
Civilizations of China and Japan; emphasis on institutional development. Hist 195: beginnings to about 1800. Hist 196: from eve of the modern era to present. (Academic year)

197 **Oral History and Interview Techniques** (4) Staff
Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area.

198 **Special Topics in History** (3) Staff
Historical perspectives on great issues of past and present. New topic each semester.

199 **Proseminar: Readings for the History Major** (3) Staff
Required of senior history majors. Readings and discussions on major trends in history; representative selections from the classics of historical literature. Students who receive credit for Hist 199 cannot receive credit for Hist 201. (Fall and spring)

Third Group

Prerequisite to all third-group history courses: the appropriate second-group preparation and consent of instructor.

201 **History and Historians** (3) Staff
Historiography and historical method for graduate students. Readings and discussions on major trends in history; selections from classics of historical literature. Students who receive credit for Hist 201 cannot receive credit for Hist 199. (Fall and spring)

203–4 **Research Seminar** (3–3) Staff
Offered on demand for individual research programs. Prerequisite: approval of department. (Academic year)

205 **Evolution of Nationalism in Eastern Europe** (3) Petrov
Formation of national consciousness and emergence of modern East European states after World War I. Developments of the interwar period. Open to qualified undergraduate seniors. (Fall)

206 **Revolution in Eastern Europe** (3) Petrov
Transformations of East European states during World War II. Resistance movements, communization, and national self-assertion in the immediate post-Stalin period. Open to qualified undergraduate seniors. (Spring)

207 **Seminar: the Communist Party of the Soviet Union** (3) Staff
Readings and discussions. Evolution of the Communist movement in Russia. Party origins, growth, and organization; intra- and inter-party strife. (Spring)

208 **U.S.-Soviet Strategic Relations since World War II** (3) Thornton
(Formerly Hist 216)
Discussion seminar designed to develop a conceptual framework for understanding contemporary U.S.-Soviet relations.

209–10 Seminar: Topics in Ancient History (3–3) Hadley
Readings and discussions on general topics in the history of the ancient Near East, Greece, or Rome. Topics to be announced in the *Schedule of Classes*. Students with working knowledge of the appropriate language(s) may receive research credit.

211–12 Seminar: Medieval History (3–3) Andrews
Prerequisite: Hist 111–12 or equivalent. Students with working knowledge of Latin may receive research credit. Each semester will focus on a particular area and period, with emphasis on interdisciplinary research techniques. (Academic year)

215 Transformation of the Socialist Commonwealth (3) Petrov
Soviet relations with East European and Asian socialist states from the end of World War II to the Sino-Soviet split. Changes in substance and form in relations among ruling Communist parties. Open to qualified undergraduate seniors. (Summer)

217–18 Seminar: Russian and Soviet Thought (3–3) Staff
Readings and discussions. Selected topics in the intellectual and social history of 19th and 20th century Russia. Topical and diachronic approach.

220 History of Universities (3) Andrews
The modern university since about 1830: emphasis on recent trends and their origins; influence of earlier concepts and institutions. Higher education in its larger intellectual, social, and political context: critical examination of theories. Same as EPol 220. (Spring, odd years)

224 European Intellectual History (3) Kennedy
Cultural history of the French Revolution. Interrelated changes in political and economic thought, theater, arts, religion, and science from 1789 to 1799. Continuity or discontinuity with pre- and post-revolutionary cultural life. (Spring)

***225 History of Washington, D.C.** (3) Gillette
The social history of Washington, from village to metropolis, with emphasis on the evolution of residential neighborhoods and related issues of historic preservation and conservation. Field trips.

228–29 Modern Military and Naval History (3–3) McDonald
Discussion, readings, and research in 20th-century British and American military and naval history. Special attention to World War I (Hist 228) and World War II (Hist 229). Topics include Anglo-American coalition warfare, and the wartime/peacetime interaction of strategy, diplomacy, and national policy.

†232 Comparative Communist Systems I (3) Wolchik
(Formerly Hist 213)
Ideological foundations of communism; emergence of the Soviet system; development of the international communist movement to World War II; postwar formation of the Soviet bloc. (Fall)

†233 Comparative Communist Systems II (3) Wolchik
(Formerly Hist 214)
Comparative analysis of major recent ideological trends and politic

* Offered jointly by the Department of History and the American Studies Program.
† An interdepartmental course offered by the History and Political Science Departments.

institutions and behavior among ruling and nonruling Communist parties. (Spring)

234 **Modern Archives Administration** (3) Coker*
Open to history graduate students and undergraduate majors. Lectures and discussion on all phases of administering archival materials. Classes at National Archives. (Summer 1978)

237 **Seminar: Soviet Foreign Policy, 1917-1960** (3) Petrov
Concepts and perceptions guiding Soviet relations with the outside world. From the blockade and intervention, through years of isolation, World War II, the Cold War, to "peaceful co-existence" and detente. Open to qualified undergraduate seniors. (Fall and summer)

239–40 **Early Modern European History** (3–3) Schwoerer
Readings, discussion, and research on topics selected from Western European history of the 14th through 17th centuries.

241–42 **Research Seminar: Modern European History** (3–3) Herber
Prerequisite: appropriate preparation and consent of instructor.

245 **Studies in Revolutionary History** (3) Thompson
Topic for 1979: the role of conspiracies in history. (Spring)

246 **Seminar: Modern Russian History** (3) Staff
Discussions, readings, research. Selected topics in the domestic history of modern Russia. (Fall)

247 **The Theory and Practice of Modern Imperialism** (3) Sharkey
Critical analysis of Marxist and non-Marxist theories of modern imperialism in the light of late 19th and 20th century European and American experiences in Asia, Africa, and Latin America. (Fall)

248 **Reading Seminar: Modern European and Near Eastern History** (3)
Admission by permission of instructor.

249 **European Diplomatic History** (3) Davison
Research seminar in individually selected topics concerning the foreign policies, actions, and interrelations of the European great powers and their statesmen in the 19th or 20th centuries. Reading knowledge of one language other than English required. (Fall)

251–52 **English People and Institutions** (3–3) Kenny, Schwoerer
Research seminar. Selected topics in the political, social, intellectual, and economic history of England. Each semester will focus upon one time period and special area of interest.

261 **Agrarian Society and Polity in Latin America** (3) Klarén
(Formerly The Structure of Latin American Politics)
Readings, discussion, and research on the impact of the forces of modernity (foreign capital, immigration, capitalism, etc.) on traditional rural society. (Fall)

262 **Rise of Capitalism in Modern Latin America** (3) Klarén
(Formerly Research Seminar: Latin American History)
Readings, discussion, and research on the origins and early development of capitalism in Latin America. (Spring)

* C. F. W. Coker is Director of the Modern Archives Institute.

271–72 **U.S. Social History** (3–3) Horto
Discussion seminar on American daily life, institutions, and intelle
tual and artistic achievements.

*273–74 **Research Seminar: Materials in Afro-American Culture** (3–3) Horto
Prerequisite: Hist 173–74 or equivalent. (Academic year)

275–76 **U.S. Political and Colonial History** (3–3) Haske
Research seminar. Topics, depending on student interest, selecte
from various aspects of the colonial period and from political aspec
of various periods. Admission by permission of instructor.

†277–78 **Historic Preservation** (3–3) Guthei
The preservation movement and its literature. Review of current e
perience, preservation practice, and techniques. Emerging aspects
historic preservation. Examples of historic, cultural, and humanist
values affecting preservation activities. Admission restricted
master's degree candidates in historic preservation program. (A
demic year)

279 **Research Seminar: American History** (3) Sta
Admission by permission of instructor. (Summer)

281–82 **Research Seminar: U.S. Diplomatic History** (3–3) Hi
Prerequisite: Hist 181–82 or equivalent. (Academic year)

283–84 **Research Seminar: Recent U.S. History** (3–3) Ribuf
Prerequisite: six semester hours of 100-level American history course
(Hist 283—fall)

285 **Research Seminar: Women in the United States** (3) DePau
(Formerly Hist 280)
Prerequisite: Hist 185 or equivalent. Practical examination of research
writing, and publication problems in the preparation of scholarly
articles for feminist and historical journals. (Spring)

287 **Seminar: Problems in Latin American Civilization** (3) Staf
Interdisciplinary seminar partially guided by a specialist within th
methodology of a chosen discipline; each student writes a report
some aspect of a selected key theme. Admission by permission
instructor. (Spring)

288 **History of Chinese Communism** (3) Thornt
Research seminar on selected topics related to China. Emphasis is
developing research methods, concepts, and the preparation of
scholarly paper. (Spring)

289 **Seminar: Modern Japanese History** (3) Sig
Discussion and research on selected topics in modern Japanese h
tory from the Meiji Restoration of 1868 to the present. (Spring)

291 **Seminar: 20th-Century History** (3) Sach
Research seminar on selected topics.

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* Offered jointly by the History Department and the American Studies Program.
† Joint offering of the History and Urban and Regional Planning Departments and the Americ
Studies Program.

292 **The Palestine Question in Modern History** (3) — **Sachar**
Research seminar. (Spring)

294 **Seminar: The Modern Near East** (3) — **Davison**
Readings, discussion, and research in selected political, economic, social, cultural, and international developments in the 19th and 20th centuries concerning countries from the Balkans, through Turkey and the Arab countries, to Iran. (Spring)

295–96 **The Modern Far East** (3–3) — **Johnson**
Research seminar.

297 **Confrontation in 20th-Century European and Middle Eastern History** (3) — **Sachar**
Reading and research. Crisis periods of contemporary history. Special attention to the eras of the world wars and to the impact of Western and Soviet involvement in the Mediterranean and Middle East. (Summer)

299–300 **Thesis Research** (3–3) — **Staff**
(Fall and spring)

Fourth Group

Prerequisite to all fourth-group history courses: the appropriate second-group preparation and consent of instructor.

Fourth-group history courses are primarily for doctoral students, but master's degree candidates may be admitted.

The University is a member of the Folger Institute of Renaissance and 18th-century Studies. The policies of the Institute are set by a central committee on which each member institution is represented. Doctoral students enrolled in one of the Institute seminars are eligible to apply for fellowship aid. Folger Institute Seminars are numbered 301 through 308. Students wishing to register for these courses should consult the chairman of the History Department.

301–308 **Folger Institute Seminars** (3 each) — **Staff**
Topics will be announced.

321–22 **Readings in Early Modern History** (3–3) — Schwoerer, Herber

342 **Readings in Modern European History** (3) — **Davison**
From the French Revolution to the period following World War I. (Spring)

345 **Readings in Russian History** (3) — **Thompson**

*373–74 **Readings on the Negro in American Culture** (3–3) — Horton
(Academic year 1978–79 and alternate years)

375–76 **Readings in U.S. Political History** (3–3) — **Haskett**
(Hist 375—fall)

†379–80 **Readings in Economic History** (3–3) — **Sharkey**
Hist 379: American economic history. Hist 380: modern European economic history. (Academic year)

* Offered jointly by the History Department and the American Studies Program.
† An interdepartmental course offered by the History and Economics Departments.

381–82 Readings in American Diplomatic History (3–3) Hi
(Hist 382—fall)

385 Readings in the History of Women in America (3) DePau
Intensive bibliographic and historiographic examination of bro
subject areas within which class members have active researc
interest. (Spring)

386 Readings in Early American History (3) DePau
(Fall)

387–88 Readings in the History of Sino-Soviet Relations (3–3) Thornto
A systematic approach to the study of the history and historiograph
of Sino-Soviet relations. Hist 387: 1917–1949; Hist 388: 1950 to t
present.

395–96 Readings in Modern Far Eastern History (3–3) Johnso
Sta

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Philosophy gener
examination. May be repeated for credit. (Fall and spring)
Sta

399 Dissertation Research (arr.)
Limited to Doctor of Philosophy candidates. May be repeated f
credit. (Fall and spring)

HUMAN KINETICS AND LEISURE STUDIES

Professors L.M. Stallings, J.L. Breen *(Chairman)*, D. Hawkins, J.E. Snodgra
Professorial Lecturers M.R. Hanson E.L. Shafer, R. Anzola-Betancour
C.A. Troester, Jr.
Associate Professors L.H. George, M.R. Withers, A.L. Dickerson *(Research)*
Adjunct Associate Professor D.C. Paup
Associate Professorial Lecturers J.W. Eberhard, T. Songster
Assistant Professors H. Nashman, N.D. Johnson
Assistant Professorial Lecturers B.S. Katz, S.Y. Cha, L. Houstoun, Jr., P.G
Davidoff, D.L. Edgell
Lecturers M.M.H. Ramsay, J. Sellars, M.H. Svehla, S.N. Smith, E.A. Burk
hardt, J.V. Ackerman, K. Cotton, J.J. Goldblatt
Instructors D.C. Park *(Research)*, Andrea Morris *(Research)*

Programs of study leading to the degrees of *Bachelor of Science in Huma* *Kinetics and Leisure Studies* (opportunity for specialization in elementary a
secondary school physical education, dance education, or dance as a p
forming art) and *Master of Arts in Education* (with specialization in adapti
physical education, dance, perceptual-motor development, general physi
education, therapeutic recreation, or tourism development and travel admin
tration) are offered by the School of Education and Human Development (s
pages 103–32).

From three to four semester hours of first-group human kinetics and leisu studies courses are required for bachelor's degree candidates in the educati
and human kinetics and leisure studies curriculum.

The University is not responsible for injuries received in any of the activit
of the Department of Human Kinetics and Leisure Studies, and the stud
assumes full responsibility therefor.

First Group

Students whose medical examinations indicate the desirability for remedial or restricted activity are assigned to programs especially adapted to their needs. Unless otherwise indicated, all first-group courses are offered both in the fall and spring semesters.

All first-group courses may be repeated with permission of the instructor.

10 Beginning Badminton (1)	Breen
11 Beginning Bowling (1)	Staff
12 Introduction to Ballet (1)	Staff
13 Beginning Ballet Technique (1)	Staff
14 Beginning/Intermediate Ballet Technique (1)	Staff
15 Beginning/Advanced Ballet Technique (1)	Staff
16 Introduction to Modern Dance (1)	Staff
17 Beginning Modern Dance Technique (1)	Staff
18 Beginning/Intermediate Modern Dance Technique (1)	Staff
19 Ethnic Dance (1)	Staff
20 Beginning/Intermediate Golf (1)	Staff
21 Foil Fencing (1)	Snodgrass
22 Basketball (1)	Staff
24 Volleyball (1)	Staff
26 Beginning Karate (Korean Style) (1)	Cha
27 Beginning Tennis (1)	George
28 Beginning/Intermediate Karate (Korean Style) (1)	Cha
29 Yoga (1)	Staff
30 Body Conditioning (1)	Snodgrass
31 Backpacking (1)	Staff
32 Beginning Swimming (1)	Staff
33 Swimming/Life Saving (1)	Staff
35 Slimnastics and Weight Training (1)	Staff
36 Springboard Diving (1)	Staff
37 Soccer (1)	Staff
38 Racketball (1)	Staff
39 Handball (1)	Staff
40 Squash (1)	Staff
41 Soccer (1)	Staff
50 League Bowling (1 or 2)	Staff

51 Gymnastics (2)
Emphasis on apparatus and trampoline.

52 Modern Dance Technique I (2)

53 Modern Dance Technique II (3)
Prerequisite: HKLS 52 or permission of instructor.

54 Intermediate/Advanced Tennis (2)
Development of skills, theories of strategy; emphasis on competitive play as a lifetime sport.

55 Swimming—Water Safety Instruction (2)

56 Scuba Diving (2)
Laboratory fee, $100.

57 Intermediate/Advanced Badminton (2)
(Spring)

58 Intermediate Ballet Technique (3)
(Formerly 2 credit hours)
Admission by permission of instructor.

59 Team Sports (2)
(Fall)

60 Racket Sports (2)
(Spring)

61 Aquatics (2)
(Fall)

62 Conditioning/Weight Training (2)
(Spring)

63 Games and Movement Activities for Children (2)
(Spring)

64 Horseback Riding (2)
Laboratory fee, amount announced in *Schedule of Classes.*

65 Skiing (2)
Laboratory fee, amount announced in *Schedule of Classes.*

66 Synchronized Swimming (2)

68 Sport Clinics (2)
Special intensive study and skill development.

Second Group

101 Physical Education and Sports in Human Resource Centers (3)
Development of physical education and sports programs in school and play settings. Includes philosophy and curriculum.

102 Movement Education (3)
Techniques of teaching movement education with emphasis on problem-solving methods for kindergarten and grades 1–6. (Fall)

103 Professional Foundations and Concepts of Human Kinetics and Leisure Studies (3) — Snodgrass

Nature and scope of human kinetics and leisure studies; scientific bases of physical education and athletic programs; orientation to professional competencies.

104 Introduction to Travel and Tourism (3) — Davidoff

Survey of the travel and tourism industry with emphasis on the travel agency, marketing tourism and travel, development of tourist destinations, and the economic and social impact of tourism. (Fall)

105 Introduction to Adaptive Physical Education and Therapeutic Recreation (3) — Park

Philosophy, methods, and concepts relating to recreation and adaptive physical education for the ill, aged, and disabled. Concepts in program planning, leadership, and adaptations of activities to special groups. Includes field visitation and analysis of activities. (Fall)

106 Introduction to Dance Therapy (3) — Staff

General survey of dance therapy areas from theoretical and experimental points of view. Exploration of professional opportunities and training. (Spring)

107 Ethnic Dance (2) — Johnson

(Formerly Teaching Ethnic Dance)

Methods and materials of folk and social forms of dance. Laboratory experiences assigned. (Spring)

108 Dance Improvisation (3) — Staff

(Formerly 2 credit hours)

Awareness of body movements, environment, group dynamics, performance and composition through improvisational technique. (Fall and spring)

109–10 Dance Composition (3–3) — Withers

HKLS 109: basic elements and principles of compositions. HKLS 110: advanced problems in composition. Prerequisite: HKLS 108 or equivalent. (Academic year)

111–12 Sports Education Technique (3–3) — Staff

Techniques for teaching individual, dual, and team sports. (Academic year)

113–14 Practicum in Physical Education, Dance or Leisure (3–3) — Staff

Pre-practice teaching or leadership in elementary or secondary school physical education; adaptive physical education, dance, or leisure settings. Seminars relating to field experiences. (Academic year)

115 Movement Technique for Theater (1) — Ramsay

(Formerly HKLS 124)

Basic body awareness, sensory awareness, and movement exploration. Analysis of movement and dramatic justification of movement. May be repeated for credit. (Fall)

116 Mime Movement and Theater (2) — Ramsay

(Formerly 1 credit hour)

Fundamentals of mime for the beginner. Isolation and illusion ex-

ercises. Work with masks, building improvisation and set pan
mimes. May be repeated for credit. (Spring)

117 **Dance Education** (3) Johns
Organizational, methodological, philosophical and conceptual
proaches to the teaching of dance in academic and nonacademic
tings. Prerequisite: HKLS 157. (Fall)

118 **Special Problems in Dance Composition** (1) St
Work with elements of movement leading to short composit
studies. Prerequisite: HKLS 109–10 or equivalent. (Fall and spri

119 **Creative Dance for Children** (3) Withe
Dance as an expressive art medium for children; concepts, princip
methods and materials. Emphasis given to dance in elementary e
cation with consideration for special education. (Spring)

120 **Repertory** (1 or 2) St
Study and performance of dance works. Admission by permission
instructor. May be repeated for credit.. (Fall and spring)

121 **Modern Dance Technique III** (1 to 3) St
(Formerly Dance Technique III)
Intermediate/advanced modern dance. Prerequisite: HKLS 53. Adm
sion by permission of instructor. May be repeated for credit. (F
and spring)

122 **Methods and Materials for Health Education** (3) St
Conceptual approach to curriculum design and teaching, includi
planning and organization, methodology, selection and use of ma
rials and evaluation; basic health knowledge. (Fall and spring)

123 **Modern Dance Technique IV** (2 or 3) Withe
(Formerly Dance Technique IV)
Advanced modern dance. Prerequisite: HKLS 121. Admission by per
mission of instructor. May be repeated for credit. (Fall and spring)

129 **Introduction to Motor Learning** (3) Stalling
Concepts of motor skill learning applied to the teaching of moveme
skills. (Fall)

130 **Introduction to Motor Development** (3) Snodgra
(Formerly Motor Performance in Childhood)
Study of the evolvement and refinement of fundamental moveme
skills. (Spring)

133 **Student Teaching** (6 to 12) Nashm
Prerequisite: HKLS 113–14 or equivalent. Admission by permiss
of instructor. (Fall and spring)

135–36 **Dance History** (3–3) Johns
Study of dance from antiquity to present; emphasis on cultural
nificance of dance as art, education, and social behavior. (A
demic year)

137 **Dance Notation and Movement Analyses: Labanotation** (3) K
Concepts and elementary principles underlying Laban's system
dance notation with emphasis on dance repertory. (Spring)

138 **Curriculum, Organization and Administration of Physical Education and Athletics** (3) George

Curriculum and administration related to physical education and athletic programs. Professional ethics. (Fall)

139 **Coaching Behavior** (3) Snodgrass

Study of behavioral patterns and interactions related to individual and team sports. (Spring)

141–42 **Theater Production for Dance** (3–3) Staff

(Formerly 2-2 credit hours)

Theories and practicum in technical aspects of dance production, lighting, sound, theater management, costuming, make-up, and audiovisual techniques. (Materials to be purchased.) (Academic year)

144 **Choreography** (3) Staff

Solo and group. May be repeated for credit. Prerequisite: HKLS 109–10 or equivalent; HKLS 141–42 recommended. (Fall and spring)

150 **Introduction to Human Anatomy** (3) Stallings

(Formerly Human Anatomy)

Systematic study of the structure of the human body; emphasis on kinesiological anatomy, including joints, muscles, and neuromuscular integration. Laboratory fee, $15. (Fall)

151 **Kinesiology** (3) Paup

Analysis of human movement, including mechanical physics, anatomy, and physiology. Prerequisite: approved course in anatomy. (Spring)

152 **Environment, Leisure, and Quality of Life** (3) Staff

Environmental problem-solving through ecological and social planning; concentration on the impact of leisure on total human physical and cultural development; emphasis on philosophical considerations. (Summer)

156 **Application of Recreational Skills to Urban Living** (3) George

Development of recreational skills; emphasis on local opportunities for recreational activities. Current trends in urban recreational development and program planning. May be repeated for credit with permission of instructor. (Fall and spring)

157 **Dance Technique Theory** (3) Staff

Theoretical foundations of dance. Applied principles of kinesiology, analysis and practice of contemporary dance techniques. (Fall)

158 **Safety: Prevention, and Care of Sports Injuries** (3) George

Safety education, liability, prevention and care of sports injuries; related personnel, facilities, and equipment.

164 **Physiology of Exercise** (3) Paup

The physiological functions of the body and the effect of exercise on these functions. Prerequisite: HKLS 150 or permission of instructor. (Fall)

171 **Current Professional Literature and Competencies** (3) Snodgrass

Study of current literature with implications for physical education;

use of library resources and retrieval systems; evaluation of profe sional competencies. Prerequisite: HKLS 103. (Fall or spring)

172 **International Experiences** (1 to 6) St
Travel to a foreign country for study of a specific topic.

173 **Independent Study** (1 to 3) St
Individually designed model for intensive study in an area of speci interest. Prerequisite: demonstrated competency for independe work and permission of adviser and instructor. May be repeated credit. (Fall and spring)

175 **Seminar in Music and Dance** (3) St
Rhythmic analyses: resources in music and accompaniment pri ciples for dance. Prerequisite: basic knowledge of rhythmic theor (Spring, even years)

178 **Designing and Implementing Conferences and Meetings** (3) Nadle
Same as Educ 178. Use of design committees, steering committee selection of resource people, site selection, exhibits, and relation supplier personnel. Special attention to designing the core of th conference, and related conference activities.

184 **Workshop** (1 to 3) Staf
May be repeated for credit with permission of advisor.

Third Group

200 **Experimental Course** (1 to 3) Staff
Courses offered for the first or second time. May be repeated for credit with the approval of the advisor.

202 **Conceptual Basis of Motor Learning** (3) Stallings
Variables of perceptual motor learning and performance; theories, concepts, and models of learning related to the development of motor skills. (Fall and spring)

205 **Perceptual-Motor Programs: Diagnostic-Therapeutic Techniques** (3) Stallings
Programs of perceptual-motor therapy and their basic assumptions and diagnostic-therapeutic techniques. (Spring)

230 **Advanced Concepts in Motor Development** (3) Snodgrass
(Formerly Movement Analysis of the Young Child)
Study and practice in techniques of critical observance and analysis of motor behavior throughout the life span, with special emphasis on period from birth to age eight and on the aged. (Fall)

232 **Current Issues in Elementary School Physical Education** (3) Snodgrass
Current philosophy, trends, and research; implications for curriculum instruction, evaluation. (Spring)

239 **Urban Recreation for Special Populations** (3) Staff
Development of recreation for disabled, elderly, and other special populations. Development of competencies in community organization, communications, consultation, program development and evaluation. (Spring)

240 Physical Education for the Handicapped (3) **Songster**

Adaptive physical education for handicapped populations; development of competencies in diagnostic-prescriptive teaching, program design and evaluation, consultation, and communications. (Fall)

244 Therapeutic Recreation Practice (3) **Staff**

Professional competencies for delivery of therapeutic recreation services to handicapped populations in clinically oriented settings. Emphasis on client assessment, activity analysis, treatment programming, and relationship of therapeutic recreation to total rehabilitation goals. (Spring)

245 Medical Aspects of Disabilities and Handicapping Conditions (3) Hawkins

(Formerly Medical Aspects of Therapeutic Recreation and Adaptive Physical Education)

Etiology, symptomology, and treatment of chronic and traumatic disorders associated with handicapping conditions: implications for programming and facility development as related to therapeutic recreation, adaptive physical education, and other therapies. (Fall)

250 Administration of Tourism Services (3) **Shafer**

Planning and organization of a comprehensive system of tourism services utilizing educational, cultural and recreational resources; emphasis on public relations, personnel administration and supervision, cost-benefit analysis, fiscal management and managerial accountability. (Spring)

251 Leisure Counseling (3) **Staff**

The application of counseling and guidance techniques to leisure services. Emphasis on the impact of leisure on society and the individual and on the assessment of leisure functioning. (Spring)

252 Group Dynamics, Interpersonal Relationships, and Supervision of Leisure Services (3) Staff

(Formerly Supervision of Leisure Services)

Overview of group dynamics, group processes, and interpersonal relationships as related to supervision. Theory, discussion, and group experiences in group process and supervisory techniques. (Fall)

256 Sports Medicine and Rehabilitation (3) **Staff**

Theory and practice of therapeutic exercise and recreation as applied to the rehabilitation of the handicapped; injuries; preventive, adapted, and remedial concepts; research in area of general rehabilitation practice; professional roles as related to ancillary medical focus. (Spring)

260 Tourism Development (3) **Hawkins**

Theoretical and practical framework for evaluating development models using case studies which highlight existing organizational structures, decision-making systems and implementation procedures. (Spring)

261 Planning for Tourism (3) **Anzola-Betancourt**

Integrated planning for tourism organizations, financing and physical development for comprehensive tourism projects; consideration of basic concepts, approaches, and models. (Fall)

262 **Tourism Policy Analysis** (3)
Understanding components of tourism policy, development of t for tourism policy analysis, and description of tourism organizati in the government and private sector. (Spring)

265 **Sports and Politics** (3)
Methods of political analysis applied to sports policy; compara approach to the study of the relationships between ideology, nomic development, and the types and levels of government invo ment in sports policy. (Spring)

270 **Philosophic Foundations of Dance** (3)
Examination and discussion of problems in dance confronting artist, as well as the audience, in terms of dance as an art form the creation and experience of that form.

271 **Dance Reconstruction** (3)
(Formerly Dance Notation and Reconstruction)
Recreating the structure and dynamics of movement from da scores. (Fall)

273 **Advanced Choreography** (3)
Advanced choreographing of group or solo dance work. Course w includes responsibility for auditions, rehearsals, and final work sented in concert. May be repeated once for credit. Prerequisi HKLS 144 or equivalent. (Fall or spring)

276 **Dance in Society** (3)
Anthropological aspects of dance; emphasis on current research literature.

280 **Advanced Workshop** (1 to 3)
Workshops with emphasis on contemporary issues and probl development of advanced professional competencies. May peated for credit with permission of advisor. (Fall and spring)

282 **International Experiences** (1–12)
(Formerly 1-9 credit hours)
May be repeated for credit with approval of advisor.

283 **Practicum** (3 to 6)
Field work, internship and/or instructional practice, including c ference and/or seminar. May be repeated once for credit with p mission of advisor. (Fall and spring)

290 **Advanced Seminar** (1 to 3)
May be repeated for credit with approval of advisor. (Fall spring)

293 **Independent Study** (1 to 6)
May be repeated for credit with approval of advisor.

296 **Systems Analysis of Tourism Services** (3)
Comprehensive planning, human resource development, and progr facility design, using systems approaches. (Fall)

297 Advanced Topical Studies (3 or 6) **Staff**
Independent research and study pertinent to the needs of the student. Prerequisite: Educ 295 or permission of instructor. May be repeated once for credit with permission of the advisor. (Fall and spring)

299 Thesis Research (6) **Staff**

INSTITUTE FOR SINO-SOVIET STUDIES

Members of the Institute

G. Sigur *(Director)*, C.F. Elliott, A. Gyorgy, H.C. Hinton, W.R. Johnson, Y. Kim, C.A. Linden, G.A. Olkhovsky, V. Petrov, C. Shih, M. Sodaro, R.B. Thompson, R. Thornton, S. Wolchik, R.Y. Yin

Associate Members of the Institute

J. Baclawski, E.M. Hadley, J. Hardt, T. Hsia, B. Ramundo, P. True, T.W. Wolfe

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The Institute for Sino-Soviet Studies offers specialized graduate study in the School of Public and International Affairs. Students who lack background in Soviet and East Asian studies are required to take undergraduate courses selected by the advisor as prerequisite to graduate work. Related preparatory undergraduate courses include the following: Econ 101, 102, 133, 134, 169, 170; Hist 137, 138, 143, 144, 145, 146, 187, 188, 189, 195–96; PSc 1, 9, 106, 107, 108, 131, 165, 168, 170, 173; Psyc 151.

For description of the objectives and programs of the Institute, see pages 181–82. For description of the courses listed below, see the appropriate departmental listing.

ECONOMICS

267 Seminar: Soviet Economy (3) Hardt
268 Seminar: Economic Theory and Development in Communist Countries (3) Hardt
269 Economy of Communist China I (3) Yin
270 Economy of Communist China II (3) Y
271 Economy of Japan (3) Hadl T. \.

GEOGRAPHY AND REGIONAL SCIENCE

265 Seminar: Geography of the Soviet Union (3) Baclawski
266 Seminar: Geography of China (3) True

HISTORY

205 Evolution of Nationalism in Eastern Europe (3) Petrov
206 Revolution in Eastern Europe (3) Petrov

207	*Seminar: the Communist Party of the Soviet Union* (3)	Staf
208	*U.S.-Soviet Relations Since World War II* (3)	Thornto
215	*Transformation of the Socialist Commonwealth* (3)	Petro
217–18	*Seminar: Russian and Soviet Thought* (3–3)	Sta
*232	*Comparative Communist Systems I* (3)	Wolchi
*233	*Comparative Communinst Systems II* (3)	Wolchi
237	*Seminar: Soviet Foreign Policy, 1917-1960* (3)	Petro
245	*Studies in Revolutionary History* (3)	Thompso
246	*Seminar: Modern Russian History* (3)	Staf
288	*History of Chinese Communism* (3)	Thornto
289	*Seminar: Modern Japanese History* (3)	Sig-
295–96	*The Modern Far East* (3–3)	Johnso
345	*Readings in Russian History* (3)	Thompso
387–88	*Readings in the History of Sino-Soviet Relations* (3–3)	Thornto
395–96	*Readings in Modern Far Eastern History* (3–3)	Johnso

†LAW

546	*Soviet Law* (2)	Ramund
547	*Chinese Law* (2)	Hsi

POLITICAL SCIENCE

207	*Readings in Socialism and Communism* (3)	Elliott, Linden, Wolchik
208	*Readings in Marxism and Leninism* (3)	Elliott, Linden
230	*Comparative Government and Politics I* (3)	Kim, McClintock
231	*Comparative Government and Politics II* (3)	Kim, McClintock
*232	*Comparative Communist Systems I* (3)	Wolchik
*233	*Comparative Communist Systems II* (3)	Wolchik
251	*Principles and Problems of International Political Communication* (3)	Staff
263	*Communism in Non-Communist Europe* (3)	Sodaro
264	*Political and Social Institutions of Eastern Europe* (3)	Gyorgy
265	*Government and Politics of Eastern Europe* (3)	Gyorgy
266	*Readings in Soviet Government and Politics* (3)	Elliott, Linden
267	*Soviet Government anud Politics* (3)	Elliott, Linden, Wolchik
268	*Soviet Foreign Policy* (3)	Elliott
269	*Soviet Military Policy and Strategy* (3)	Wolfe, Elliott
270	*Politics of Mainland China I* (3)	Hinton
271	*Politics of Mainland China II* (3)	Hinton
272	*Foreign Policy of Mainland China* (3)	Hinton
275	*International Politics of the Far East* (3)	Hinton
276	*Government and Politics of Japan and Korea* (3)	Kim
291	*Colloquium: East Asia* (3)	Hinton
292	*Colloquium: Russia and Eastern Europe* (3)	Gyorgy

* An interdepartmental course offered by the History and Political Science Departments.
† Students who elect courses in law must have the permission of the Dean of the National Law Center. For course descriptions, see the *National Law Center Bulletin*.

INTERNATIONAL AFFAIRS

See **Public and International Affairs.**

INTERNATIONAL RELATIONS—DOCTORAL PROGRAM

Doctoral Program Committee in International Relations

B.M. Sapin *(Chairman)*, R.M. Dunn, Jr., A. Gyorgy, W.R. Johnson, B. Nimer, B. Reich, P.F. Klarén

The Graduate School of Arts and Sciences offers an interdisciplinary program leading to the degree of Doctor of Philosophy in the field of international relations. (The School of Public and International Affairs offers a Master of Arts degree program in the area of international affairs.) The program is directed by a committee whose members are drawn from the Economics, Political Science, and History Departments.

Required: the general requirements, pages 90–92, 98–100. Each program must include three disciplines and five fields of study. However, in some cases, cohesive and well-integrated programs based on two disciplines may be approved. Specific program guidelines are available from the Graduate School on request.

ITALIAN

See **Romance Languages and Literatures.**

JAPANESE

See **East Asian Languages and Literatures.**

JOURNALISM

Professorial Lecturers F.L. Dennis, H.L. Coppenbarger, H.E. Paine, P. Silberman, C.W. Puffenbarger

Associate Professors R.C. Willson, P. Robbins *(Chairman)*

Associate Professorial Lecturers R.L. Courage, J.P. McGill, E. Rogers, N.T. Gregg, J. Goldsmith, W.L. Lawbaugh, W.R. Fonda, G.C. Thelen, D.A. Sparks

Assistant Professorial Lecturers T.W. Zito, Jr., J.G. Glover, B.D. Colen

Bachelor of Arts with a major in Journalism (Departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students planning to major in journalism should take Engl 11 rather than Engl 12 in satisfying the English composition requirement.)
2. Prerequisite courses—Engl 51–52 or 71–72; Jour 71–72; PSc 1 and 2 or 2 and 3.
3. Required courses in the major—24 hours of second-group courses in

Journalism, including (a) Jour 111, 196, 198; and (b) nine semester hours chose from Jour 121, 125, 133, 135, 137, 138, 139, 151, 155.

4. Required as a minor area of concentration—a minimum of 18 semest hours of second-group courses, chosen in consultation with the major advis in one other department or field of study in Columbian College of Arts a Sciences.

Recommended Electives: Econ 121, 142, 161, 162, 181–82; PSc 111, 112, 114–1 116, 118, 119, 120; Psyc 115; SpDr 133, 134, 135–36; Stat 53, 97.

Departmental prerequisite: Jour 111 is prerequisite to Jour 125, 133, 135, 1 138, 139, 190 and 196.

First Group

71–72 Introduction to Mass Communication (3–3) Willso

Jour 71: evolution of newspapers and other media in relation t political, social, and economic life; concept of press freedom. Inter national students who lack knowledge of U.S. history should tak Hist 71–72 before taking Jour 71. Jour 72: mass media, problems o contemporary journalism, emphasis on federal government-media re lations. (Academic year)

Second Group

111 Reporting (3) Robbin

Gathering, evaluating, and writing news. Some typing required Laboratory fee, $5. (Fall and spring)

115 Newspaper Editing and Make-up (3) Coppenbarger, Coldsmit

Preparation of news copy, pictures, and other graphic material fo publication; evaluation of news; page layouts; newspaper make-up (Fall and spring)

116 Magazine Layout and Design (3) Paine

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry. (Fall)

117 Magazine Editing (3) Lawbaugh

The editor's responsibility to publisher and readers. Setting the editorial goals and planning content and production to meet them Editing copy for general and specialized magazines.

121 Feature Writing (3) Willson

Free-lancing nonfiction articles, materials obtained through inde pendent investigation. (Fall and spring)

125 Science Writing (3) Staff

Writing science news for the mass media. (Spring)

133 Advanced Reporting: Community News (3) Puffenbarger

Coverage and writing of local news. (Fall)

135 Advanced Reporting: Consumer Affairs (3) Thele

Specialized training in the consumer news field. (Fall)

137 Advanced Reporting: National Affairs (3) — Silberman
Coverage and writing of federal government news. (Fall)

138 Investigative Reporting (3) — Puffenbarger
In-depth reporting in selected areas of political, economic, and social affairs. (Spring)

139 Advanced Reporting: Radio and Television News (3) — Cheely, Blount
Preparing news and public affairs programs for broadcast media. (Spring)

140 Photojournalism (3) — Fonda, Gregg
Taking and processing photographs for publication, picture selection, cropping, captions. Students must purchase their own film and print paper. Laboratory fee, $25. Students who received credit for Art 23 or 24 cannot receive credit for Jour 140. (Fall and spring)

141 Intermediate Photojournalism (3) — Sparks
Advanced news and feature photography, editing, layout and photo essays. Students must purchase their own film and print paper. Laboratory fee, $25. Prerequisite: Jour 140 or Art 23–24. (Spring)

142 Advanced Photojournalism (3) — Rogers
Picture stories and photo essays in black and white or color; emphasis on layout, captions, text. Students must purchase own film and print paper. Laboratory fee, $25. Admission by permission of instructor.

145 Principles and Problems of Public Relations (3) — McGill
Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs. (Fall and spring)

146 Government Information (3) — Courage
Growth of information activities in government and the role of the information specialist. Writing and editing for government information operations. (Spring)

150 News Coverage in Washington (3) — Staff
The Washington news beats, channels and sources of news in the nation's capital, uses and abuses of the media. Field trips to local news centers and press briefings. Guest lecturers from the Washington press corps.

151 Editorial Writing (3) — Robbins
Techniques of editorial writing, conducting the editorial page, function of editorials and columns of news commentary in a free press. (Spring)

155 Critical Writing and Reviewing (3) — Zito, Glover
Reviewing and commenting on the arts and entertainment for the mass media. (Fall)

160 The New Journalism (3) — Robbins
A survey of the impact of fiction techniques on modern nonfiction reportage. Study of selected writers to identify influences and trends.

170 News Publication Management (3) Coldam

The business side of publishing. Study of the roles of advertisi circulation, promotion, accounting and administration, and mecha cal departments in newspapers and other publications. (Spring

190 Internship in Journalism (3)

Study of a journalistic medium in action by assignment to a Wa ington area news office. Admission restricted to senior journali majors selected by a departmental committee. (Fall and spring

St

196 Senior Project (3)

Open only to journalism majors. Major journalistic effort undertak in consultation with a member of the journalism staff. A writt request describing the project must be presented to the staff mem for approval, and filed with the student's advisor in the semes before registration. (Fall and spring)

Dena

198 Law of the Press (3)

Freedom of the press, censorship, legislative controls, publication contempt of court, copyright, newsgathering agencies, labor law a the newspaper business, law of libel, privileged matter, fair co ment on public characters, right of privacy. (Fall)

JUDAIC STUDIES

Committee on Judaic Studies

D.A. Altshuler *(Chairman)*, R.H. Davison, R.G. Jones, T.Z. Lavine, B. Nim B. Reich, H.M. Sachar, J.E. Ziolkowski

Columbian College of Arts and Sciences offers an interdisciplinary pro gram in Judaic Studies leading to the degree of Bachelor of Arts. Th program is intended for students who wish to investigate the histo language, literature, religious and philosophical thought, and politic social experience of the Jewish people from the perspective of several academic disciplines. (Students who wish to concentrate on the religious aspects of Judaism and its relationship to the other religious traditions the world may prefer to elect a major in religion with an emphasis Judaism [see page 436].)

Bachelor of Arts with a major in Judaic Studies (Interdepartmental)—T following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Clas 21–22, 23–24; Rel 9, 23.
3. Required courses for the major (30 semester hours):

(a) Clas 103 or 104; Hist 158; PSc 179; Rel 113-14 or 115-16, 213 or 23

(b) two meaningfully related courses selected from each of two of following groups: I—Anth 177, 183; Art 111, 112; II—Hist 108, 109, 110, 113, 121, 122, 123, 124, 139, 140, 171, 172, 193, 194, 292, 293, 294; III—Phil 111, 113, 127, 131, 172; IV—PSc 177, 178; V—Rel 103, 104, 105, 107, 111, 122, 126, 143, 144, 145, 146, 161, 162, 172, 174, 181, 184, 291, 292.

Students applying for the 90-hour degree program in Judaic Studies must addition to meeting the general requirements (see page 82), present dence of exceptional preparation in the field of Judaism, provide strong rec mendations from high school teachers and/or counselors, and complete satisfactory interview with the Committee on Judaic Studies.

LATIN AMERICAN STUDIES

Committee on Latin American Studies

M. Gordon *(Chairman)*, F. Belaunde-Terry, T.F. Carroll, J. Grunwald, R.L. Humphrey, Jr., P.F. Klarén, M. Koch-Weser, J.W. Robb, F.R. Siegel, G. Stuart, C. McClintock, F. Thoumi

Bachelor of Arts with a major in Latin American Studies (Interdepartmental) The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Anth 2, Econ 1–2, PSc 1 or 3.
3. Required courses in related areas—Span 1–2, 3–4; or equivalent. (Span 9-10 or equivalent is recommended.)
4. Required courses in the major—(a) Anth 172, 184, or 185; Econ 185; Geog 161; Hist 163–64; PSc 183, 184; and six semester hours chosen from Span 151–52, 155–56, 157–58, or other approved courses; (b) 18 semester hours, including an interdisciplinary seminar (287) in one of the following areas: anthropology, economics, geography and regional science, Hispanic literatures, history or political science. The required courses listed in (a) which are in the selected area may be included in computing the required 18 semester hours for (b).

Master of Arts in the field of Latin American Studies—See the School of Public and International Affairs, pages 165–82.

Candidates for the degree of Doctor of Philosophy may elect Latin American history as an area of specialization in the field of history, Spanish American literature as an area of specialization in the field of Romance Languages and Literatures, or politics of Latin America as an area of specialization in the field of political science.

Courses Dealing with Latin America:

Anthropology—170, 172, 184, 185, 262, 268, 272, 282, 287
Economics—185, 233, 234, 251–52, 285, 286, 287
Geography and Regional Science—127, 161, 223, 261, 287
History—161, 163–64, 165, 166, 261, 287
Political Science—183, 184, 283, 284, 285
Portuguese—31–32
Spanish—91–92, 151–52, 155–56, 157–58, 197–98, 253, 255, 256, 261, 264, 266, 287

LATIN

See **Classics.**

MANAGEMENT SCIENCE

Professors R.F. Ericson, G.L. Lippitt, D.D. Roman, P.B. Vaill, J. Harvey
Professorial Lecturers T. O'Connor, G.B.M. Hopper, R.H. Walther, J.F. Coates
Associate Professors J.F. McCarthy, Jr. *(Chairman)*, T.E. Shaughnessy, R.L. Holland, E.K. Winslow, W.E. Smith, W.W. Hardgrave, E.B. Adams, J.P. Coyne, E.B. Peters (Visiting), E.H. Forman

Adjunct Associate Professor J. Lobuts, Jr.
Assistant Professors S. Umpleby, E.W. Hahn

Programs of study leading to the degrees of Bachelor of Business Administration, Master of Business Administration, Doctor of Business Administration and Doctor of Public Administration are offered by the School of Government and Business Administration (see pages 133–64).

Second Group

118 Introduction to Information Processing (3) Smith, Coyne, Forma
Basic principles, terminology, and methods of computer data processing. Introduction to the use of the computer as a tool through assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the SGBA computer with the School's computer terminals. Laboratory fee, $25. (Fall and spring)

119 Computer Programming for Information Systems (3) Smith
COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flow charting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $2
(Fall and spring)

120 Information Systems Development I (3) Coyne, Smith
Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor. Laboratory fee, $25. (Fall)

121 Information Systems Development II (3) Coyne, Smith
A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor. Laboratory fee, $25. (Spring)

122 Special Studies in Information Systems (3) Coyne, Smith
An independent or group-study project in information systems development which may involve faculty-supervised research, a case study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission of instructor. (Fall and spring)

Third Group

201 Advanced Administrative Management (3) Adams, Ericson, Eastin, Brown, Page, Roman, Loess
Integrative approach to organization and management concepts, philosophy and theory as applied to all types of agencies and institutions. Evolution of management thought, functions, practices, and contemporary issues. (Fall and spring)

202 **Mathematics and Statistics for Management** (3) Hardgrave, Forman, Hahn

For designated students in the MBA program. Mathematical and statistical concepts employed in the solution of managerial problems. Applications of functions, elements of calculus and linear algebra. Frequency distribution, probability, and statistical inference.

203 **Mathematics for Management** (3) Hahn, O'Connor

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus, and linear algebra to optimization problems. Prerequisite: knowledge of algebra. (Fall and spring)

204 **Quantitative Factors in Administration** (3) Hardgrave, Forman, Hahn

Survey of quantitative techniques in solution of management problems. Potentials and limitations of mathematical models and proper areas for their application. Breakeven analysis, linear programming, probability, decision-making under uncertainty, queuing models, inventory models. (Fall and spring)

207 **Human Behavior in Organizations** (3) Lippitt, Winslow, Harvey, Vaill

Individual, group, intergroup, and other human behavior and development; application of behavioral science research to administration. Learning exercises and practical applications emphasized. Prerequisite: Mgt 201. (Fall and spring)

208 **Current Issues in Organizational Behavior** (3) Winslow

Study of behavioral factors relating to issues such as automation, ethics, interpersonal relations, organizational change, and similar problems. Problems in behavioral science research. Prerequisite: Mgt 207. (Fall and spring)

210 **Behavioral Factors in the Process of Change** (3) Harvey, Winslow

Review of research, theory, and practice related to the process of human change. Students are provided the opportunity to apply their learning in various settings and to demonstrate competence in various media. This course emphasizes the relationship between theory and practice. Prerequisite: Mgt 207 or permission of instructor. (Fall and spring)

212 **Organizational Development: Concepts and Methods** (3) Lippitt, Harvey, Vaill

Primarily for doctoral students. Examination of different concepts of organizational structure, processes, and growth. Models of organizational change will be developed with a taxonomy of methods of initiating action to further organizational development. Prerequisite: Mgt 207, 210; or equivalent. (Fall)

213 **Consultative Processes in Organizations** (3) Lippitt, Harvey

Primarily for doctoral students. Examination through actual practice, as well as theory, of the nature of the helping process between one person or group and another person or group. Dynamics of the consulting process will be explored as well as role differences in internal and external consultation. Development of skill in the helping relationship will be furthered. Prerequisites: Mgt 207, 210; or equivalent. (Spring)

218 Computer Programming with Business Applications (3) Coyne, Smi

For designated students in the MBA program. Basic principle terminology, and organization of computer systems. Emphasis on d veloping a proficiency in the use of higher-level programming la guage via computer solutions to production management an accounting problems.

225 Managerial Statistics I (3) Hardgrave, Forman, Ha

Mathematics of probability and statistics and application to manag ment science and operations research. Topics include sample spac random variables, discrete and continuous probability distributio moments, sampling theory, and point and interval estimation. Pr requisite: Mgt 203 or equivalent. (Fall and spring)

226 Managerial Statistics II (3) Hardgrave, Forman, Ha

Applications of the theory and techniques of mathematical statistic Topics include hypothesis testing, nonparametric methods, analys of variance, regression and correlation. Prerequisite: Mgt 225. Labora tory fee, $10. (Fall and spring)

227 Mathematical Programming: Techniques and Applications (3) Hardgrave, Forman, Ha

Technical and applied considerations of linear programming an related methods. Mathematical and computational aspects of linea programming. Formulation of linear programming models. Studies o applications of linear programming. Introduction to integer progr ming, algorithms, and formulations. Prerequisite: Mgt 203 or equi lent. Laboratory fee, $10. (Fall)

228 Techniques of Operations Research (3) Hardgrave, Forman, Hab

Survey and introduction to contemporary operations research tech niques, including nonlinear programming, dynamic programming, in ventory and queuing models and simulation. Applications of such methods as models of common processes. Prerequisite: Mgt 225, 227 (Spring)

229 Seminar: Management Sciences and Operations Research (3) Hardgrav

Advanced modeling exercises in applied operations research. Pr requisite: Mgt 228 or permission of instructor. (Spring)

230 Administration of Research and Development (3) Rom

Examination of technological, political, and economic factors affe ing the R&D environment; operational aspects; management proble in military, governmental, and industrial organizations; project se tion, resource allocation, personnel, planning and control, measu ment and evaluation. (Fall)

232 International Research and Development (3) Rom

Technological, political, social, and economic factors affecting int national R&D policy; problems in industrial, governmental, a international organizations; world technological forecasting; resou allocation; technology transfer. Prerequisite: Mgt 231 or permiss of instructor. (Fall)

233–34 **Technology Assessment Theory and Practice** (3–3) Coates

Mgt 233: the technology assessment concept. Methods for conducting assessments. Management of assessments. Evaluation of selected assessments. Mgt 234: planning and conducting a technology assessment. Prerequisite to Mgt 234: Mgt 233 or permission of instructor. (Academic year)

239 **Seminar: Administration of Research and Development** (3) Roman

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: six to nine semester hours of research and development management or permission of instructor. (Fall)

240 **Survey of Information Technology** (3) Adams, McCarthy

Management-oriented survey of key areas in information technology including hardware, software, systems development, management and the computing milieu. Laboratory fee, $25. (Fall and spring)

241 **Management Information Systems Development and Application** (3) McCarthy

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems specifications. The roles of both management and systems design personnel in the systems development process studied and evaluated. Impact of management information systems upon the organization and its decision-making processes evaluated. Case studies. Prerequisite: an introductory course in information technology, or permission of instructor. (Fall and spring)

242 **Comparative Computer Systems** (3) Coyne

Characteristics and capacities of the range of information processing equipment in use today. Recent and prospective equipment and software development. Selection of computers and related software and equipment. Prerequisite: Mgt 241 or permission of instructor. (Spring)

243 **Management of Information Technology** (3) Adams

Advanced course emphasizing principles, practices, and trends in the management of information technology. Case studies. Prerequisite: Mgt 241, 242; or permission of instructor. (Fall)

244 **Information Systems and Telecommunication** (3) Coyne, Forman, Smith

Principles of telecommunications: the applications of telecommunications for the transmission of data between computers, between humans, between humans and computers. Telecommunications terminology, hardware and software considerations, legal and policy issues, recent developments, and calculations necessary for the specification and design of telecommunications systems. Laboratory fee, $25. (Fall)

245 **Data Base Management** (3) Smith, Coyne

An in-depth approach to the understanding and use of the latest techniques for developing and implementing an effective data base

system. Topics include data base organization, creation, and ma
nance; effort and economic justification; evaluation cri
standardization of data base systems; impact of packaged data
agement systems; and an analysis of the current state-of-the-a
data base development. Students will become proficient in the
of an actual data base management system. Prerequisite: Mgt
241. Laboratory fee, $25. (Spring)

246 Workshop in Data Base Management Systems (3) Coyne, Forman,

Analysis and solution of complex business information probl
through commercially available data base management systems;
velopment of evaluation methodology, management of implem
tion strategies. Students will obtain "hands-on" experience wi
least four major commercial systems. Prerequisite: Mgt 245. La
tory fee, $25.

247 Higher-Level Programming Languages for Business Applications (3) Coyne, Forman, S

Use of major programming languages in business environme
Topics for each language will include: syntax and semantics, eas
learning, coding and debugging, documentation standards and m
tenance, suitability for business problem area and projected us
availability of language on large scale through mini-computers,
cal business applications, conversion problems. Prerequisite:
118 or equivalent. Laboratory fee, $25.

248 Design of On-Line Information Systems (3) Coyne, Forman, S

Introduction to the analysis, design and implementation of on-
business information systems. Topics will include: requirem
analysis, functional specifications, file design, man-machine dia
design, response time requirements, user psychology, human cha
and buffer capacity. Prerequisites: Mgt 118 and 241 or equiva
Laboratory fee, $25.

249 Seminar: Information Technology (3) Adams, M

Current problems in the design and implementation of comput
supported systems; emphasis on current state-of-the-art throu
discussion with leading experts in the field and analysis of literat
Prerequisite: Mgt 241, 242, 243; or permission of instructor.
and spring)

260 Introduction to General Systems and Cybernetics (3) Ericson, Adams, Umpl

Analysis of fundamental general systems and cybernetic con
evolving in various branches of knowledge and academic discip
emphasizing their transcontextual and interdisciplinary nature
stability, equilibrium, homeostasis, feedback, regulation, equifin
self-organization, variety, uncertainty, redundancy, paradox, first-
second-order cybernetics, and self-reference.

261 Fundamentals of General Management Systems and Organizational Cybernetics (GEMSOC) (3) Ericson, Adams, Umpl

Dynamics of organization and management from a general sys
and cybernetics viewpoint. Translation of GEMSOC research
theory into the world of organizational behavior and manage
practice. Prerequisite: Mgt 260.

263 **Case Studies and Field Research in GEMSOC** (3) Ericson, Adams, Umpleby

Investigation of existing organizational structures and ongoing management processes from a GEMSOC standpoint. Operational evaluations of firms and agencies, including intercontextual comparative studies. Prerequisite: Mgt 261.

264 **GEMSOC Modeling and Simulation** (3) Ericson, Umpleby, Adams
(Formerly Organizational Dynamics Simulation and Metasystemic Modeling)

Literature review and current practice analysis; modeling and simulation exercises. Continuous and discrete representations: system dynamics, set theory, kinematic graphs, information theory. Prerequisite: Mgt 261, 263.

290 **Special Topics in Management Science** (3) **Staff**

Experimental offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

295 **Research Methods** (3) **Staff**

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings. (Fall and spring)

298 **Directed Readings and Research in Management Science** (3) **Staff**

(Fall and spring)

299 **Thesis Seminar** (3) **Staff**

(Fall and spring)

300 **Thesis Research** (3) **Staff**

(Fall and spring)

Fourth Group

Fourth group courses are limited to doctoral students. They are offered as the demand requires.

311–12 **Seminar: Public-Private Sector Institutions and Relationships** (3–3)

365 **Research Seminar in GEMSOC Theory** (3) Ericson, Umpleby, Adams
(Formerly Mgt 265)

Advanced seminar on recent advances in GEMSOC. Examination of the sources of systems concepts in traditional fields; extension of existing theory into new areas. Prerequisite: Mgt 261.

366 **Philosophic and Policy Issues in Institutional Articulation** (3) Ericson
(Formerly Mgt 266)

Need for greater institutional coherence of managerial decision-making in an "only one world" frame of reference. Systemic articulation and metasystemic integration: the planned evolution of more effective institutional forms. Institutional sovereignty, organizational morality, and human values: the search for general systemic optimality. Prerequisite: Mgt 365.

390 **Philosophical Foundations of Administrative Research** (3) Lauter, Vail

Philosophy of science as applied to research in administration. Topics include the nature and current problems of epistemology, the development and role of theories, and the relationship between theory, methodology, and empirical data. (Fall and spring)

391 **Methodological Foundations of Administrative Research** (3) Lauter

Examination of the process of social science research. Use of models and theoretical frameworks in research: formulation of research questions, hypotheses, operational definitions, research design, sampling methods, and data analysis approaches. Primary emphasis on the development of dissertation proposals. (Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

May be repeated for credit. (Fall and spring)

MATHEMATICS

Professors D. Nelson, T.P.G. Liverman *(Chairman)*, H. Kenyon, C. Tsao, R.L.A. Bari, I. Katz

Professorial Lecturers D.M. Dribin, A. Thaler

Associate Professors W.A. Smith, D.R.K. Henney, I.I. Glick, M.D. Green, M.P. Lee, H.D. Junghenn, E.A. Stone

Associate Professorial Lecturers S.L. Brodsky, M.E.I. Morris, C.M. Chambers

Assistant Professorial Lecturers P.L. Hayes, W. Altman, B.F. Rice, A. Koidan, E.J. Reiser, M.J. Evans, L.A. Lee

Lectures D. Kaplan, B.M. Del Castillo, B.E. Gammon

Bachelor of Arts or Bachelor of Science with a major in Mathematics (departmental)—The following requirements must be fulfilled.

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Math 31, 32, 33. (Math 30, a prerequisite to Math 31, may be waived upon examination before registration.)
3. Required courses in the major a minimum of 24 semester hours in second-group courses in mathematics, including Math 106, 121, 123, 139 and 2[illegible]. It is also strongly recommended that students take French, German, or Russian and mathematically related courses in such subjects as physics, statistics, economics and engineering.

Bachelor of Arts or Bachelor of Science with a major in Applied Mathematics (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Math 31, 32, 33. (Math 30, a prerequisite to Math 31, may be waived upon examination before registration.)
3. Required courses in related areas:
   (a) Stat 189–90.
   (b) Eighteen semester hours to be selected, in consultation with the [illegible] visor, from the following areas of application. At least 12 semester hours m[illegible]

be chosen from one area, and the other six semester hours must be chosen from courses numbered 101 or higher. For courses in applied science, civil engineering, electrical engineering and computer science, engineering administration, mechanical engineering, and operations research, see the *School of Engineering and Applied Science Bulletin*.

Area I. Social and management sciences—courses chosen from ApSc 115, CE 183, 197; Econ 1–2, 101, 102, 123, 199; EAd 261, 269, 281–82, 283, 284; EE 184, 283, 284, 285; Math 101, 102, 113, 124; OR 201, 209, 251, 252, 261, 277, 279, 281, 291; Stat 110, 117, 118, 131, 157–58, 159, 161–62, 165–66, 188, 197.

Area II. Engineering and physical sciences—courses chosen from Chem 111–12, 113–14; CE 120, 123, 140, 166, 167, 168, 185, 190, 191, 192, 193, 198, 201, 202, 203, 204, 205, 206, 207, 210, 220, 223, 252, 254, 258, 261, 262, 263, 275; Stat 117, 118, 131, 157-58, 159, 161–62, 197; and any course offering in electrical engineering and computer science, mechanical engineering, or physics.

Area III. Computer sciences—courses chosen from EE 152, 153, 154, 157, 158; Math 101, 113, 124, 142, 153, 154, 157; Stat 110, 157 58, 161-62, 165 66, 197.

4. Required courses in the major—a minimum of 24 semester hours of second-group courses in mathematics, including Math 111, 112, 139, 140, 181 82. It is also strongly recommended that students take French, German, or Russian.

Master of Arts in the field of Mathematics—Prerequisite: a bachelor's degree with a major in mathematics from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. Students must complete 30 semester hours of approved course work, with or without a thesis, and must pass a comprehensive examination.

Master of Arts or Master of Science in the field of Applied Mathematics—Prerequisite: a bachelor's degree with a major in mathematics or a related field such as statistics, a physical science, engineering, or economics.

Required: the general requirements, pages 90–98. Course work is divided between mathematics courses and courses from one area of application—economics, engineering (civil, computer science, electrical, engineering administration, mechanical, or operations research), physics, statistics, or urban and regional planning. Courses in the chosen area of application are selected in consultation with the relevant department.

Candidates for the degree of Master of Arts must complete 30 semester hours of approved course work, including Math 299–300 *Thesis Research*, and must pass a comprehensive examination. At least 15 semester hours must be in mathematics courses, with no more than three of these from second-group courses. The remaining courses are chosen from the selected area of application. Theses are jointly supervised by the department of mathematics and the department concerned with the area of application.

Candidates for the degree of Master of Science must complete 30 semester hours of course work and must pass a comprehensive examination. At least 15 semester hours must be in mathematics courses, with no more than six semester hours from second-group courses. There is no thesis requirement.

Master of Science for Teachers—Prerequisite: A bachelor's degree; at least 12 semester hours or equivalent in mathematics courses, including the equivalent of Math 31; experience in teaching mathematics at the secondary school level.

Required: 30 semester hours of approved second- or third-group mathematics courses, including Math 168.

Doctor of Philosophy in the field of Mathematics—Required: the general requirements, pages 90–92, 98–100. The department doctoral program committee, after consultation with the student, will stipulate (1) courses which must be taken to fulfill the 48-semester-hour requirement leading to the General Examination; (2) the two languages, selected from French, German, or Russian, which must satisfy the foreign language requirement; and (3) the four areas

of study in which the student must prepare for the General Examination. The doctoral program committee will appoint a Director of Research when the student has selected (preferably early in the program) one of the following research fields for the dissertation: functional analysis (abstract differential equations, functional equations, generalized functions, groups of operators, group representations, linear algebra (matrix theory), logic, measure and integration, ordinary and partial differential equations, theory of numbers, and topology (general topology, analytic topology, topological groups).

Bachelor of Arts in Education with a teaching field in Mathematics—Prerequisite: the education curriculum, pages 113–14.

Required: the mathematics option and the professional courses listed on page 117.

First Group

3 College Algebra (3) Morris and Staff

Equivalent to the standard two years of high school algebra with several additional topics. Prerequisite: one year each of high school algebra and high school geometry. (Fall and spring)

6 Plane Trigonometry (3) Morris and Staff

Prerequisite: two years of high school algebra and one year of high school geometry, or Math 3 (or concurrent registration therefor). (Fall and spring)

9 General Mathematics I (3) Smith and Staff

For students electing Math 9 and 10 as a terminal sequence. Logic, sets, Euclidean and non-Euclidean geometries. Algebra; calculus. Prerequisite: two years of high school mathematics. (Fall and spring)

10 General Mathematics II (3) Smith and Staff

Probability and statistics. The computer. Modern mathematical systems; applications to the social sciences and humanities. Prerequisite: Math 9. (Fall and spring)

30 Precalculus (3) Bari and Staff

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry and one-half year of high school trigonometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry. (Fall and spring)

31 Calculus of One Variable (3) Kenyon and Staff

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent.* (Fall and spring)

32 Calculus of Several Variables (3) Kenyon and Staff

Techniques of integration. Partial derivatives, multiple integrals. Prerequisite: Math 31. (Fall and spring)

33 Calculus of Vector Functions (3) Kenyon and Staff

Infinite series. Taylor series. Algebra and calculus of vectors. Vector fields. Line integrals, Green's and Stokes' theorems. Prerequisite: Math 32. (Fall and spring)

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

41 Calculus for Economists I (4) Junghenn

Differentiation and integration of algebraic and elementary transcendental functions; marginal analysis for functions of one variable; optimization of functions of one variable applied to economics. Prerequisite: Math 30 or equivalent.* (Fall)

42 Calculus for Economists II (4) Junghenn

Elementary linear algebra with economics applications, including input-output models; partial derivatives; multiple integrals; marginal analysis for functions of several variables; optimization of functions of several variables applied to economics; infinite series. Prerequisite: Math 41. (Spring)

†51 Mathematics for the Social and Management Sciences I (3) Glick and Staff

Notion of function, graph of function; sequences; differential calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration. (Fall and spring)

†52 Mathematics for the Social and Management Sciences II (3) Glick and Staff

Integral calculus of functions of one variable; functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51 or 53. (Fall and spring)

†53 Mathematics for the Life, Social and Managerial Sciences I (4) Liverman and Staff

Lecture (3 hours), laboratory (2 hours). Same topics as Math 51 with computer applications and introduction to Fortran programming. Computer work emphasizes motivation of basic mathematical concepts and applied problems in indicated areas for which mechanical computation is essential. New students must take a placement examination in algebra prior to registration. (Fall)

†54 Mathematics for the Life, Social and Managerial Sciences II (4) Liverman and Staff

Lecture (3 hours), laboratory (2 hours). Same topics as Math 52 with computer applications. Computer work emphasizes motivation of basic mathematical concepts and applied problems in indicated areas for which mechanical computation is essential. Prerequisite: Math 53. (Spring)

Second Group

101 Introduction to Mathematical Logic (3) Nelson

Introduction to proof theory and model theory of propositional and predicate calculi, computability, topics from foundations of mathematics. Open to sophomores with permission of department. Prerequisite: Math 32 or permission of instructor. (Fall)

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* Math 30 may be waived as a prerequisite by examination on scheduled dates.

† Social and management science students with a strong record in high school mathematics are advised to take Math 31, 32, and 124 instead of Math 51 and 52 or 53 and 54.

102 **Axiomatic Set Theory** (3) Nelson
Zermelo-Fraenkel set theory, ordinals and cardinals, foundations of the real number system. Prerequisite: Math 101 or permission of instructor.

104 **Mathematics and Human Thought** (3) Dribin
Philosophical and historical aspects of mathematics and its interplay with other disciplines from antiquity to modern times. Prerequisite: two years of high school mathematics. (Spring)

106 **Introduction to Topology** (3) Kenyon and Staff
Prerequisite: Math 139 or permission of instructor. (Spring)

107 **Introduction to Algebraic Topology** (3) Barr
Prerequisite: Math 122 and 139, or permission of instructor. (Fall, even years)

111 **Mathematics for Engineers and Physicists I** (3) Henney and Staff
Linear differential equations, linear algebra, Fourier series and integral, nonlinear differential equations of the first order. Prerequisite: Math 32. (Fall)

112 **Mathematics for Engineers and Physicists II** (3) Henney and Staff
Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111. (Spring)

113 **Graph Theory** (3) Barr
Directed and undirected graphs; bridges, cutpoints, and blocks; connectivity; partitions; Eulerian and Hamiltonian graphs; planarity; coloring problems. Flow charts for computer applications. Prerequisite: Math 32. (Spring)

121–22 **Introduction to Abstract Algebra** (3–3) Lee and Staff
Selected topics in elementary number theory, groups, rings (including polynomial rings), and fields. Open to sophomores with permission of department. Prerequisite: Math 32 or permission of instructor. (Academic year)

123 **Linear Algebra** (3) Lee and Staff
Theory of vector spaces, linear transformations, and matrices. Quadratic and bilinear forms, spectral decomposition. Prerequisite: Math 121. (Fall)

124 **Introduction to Matrix Theory** (3) Liverman and Staff
Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors. Hamilton-Cayley Theorem. Systems of linear difference and differential equations. Quadratic forms. Applications to economic, biological, and physical models. Prerequisite: Math 32 or permission of instructor. (Fall and spring) Katz

125 **Linear Programming** (3)
Simplex algorithm, degeneracy, the assignment problem, duality theorems, post-optimality, the transportation problem, integer programming, applications. Prerequisite: Math 123 or 124, or equivalent. Staff

134 **Introduction to Boundary-value Problems** (3)
Prerequisite: Math 111 or 142. (Spring, even years)

135 **Projective Geometry** (3) — Dribin
Prerequisite: Math 123 or 124, or equivalent. (Fall, odd years)

139 **Advanced Calculus I** (3) — Taam and Staff
Topology of R^n. Continuous mappings. Uniform convergence. Differentiable mappings. Prerequisite: Math 33. (Fall and spring)

140 **Advanced Calculus II** (3) — Taam and Staff
Contraction maps, implicit function and differential equation theorems. Integration theory. Fourier series. Prerequisite: Math 139 or equivalent. (Spring)

141 **Advanced Calculus III** (3) — Stone and Staff
Tensors, differential forms, Stokes theorem, introductory differential geometry. Prerequisite: Math 140. (Fall)

142 **Theory of Differential Equations** (3) — Junghenn and Staff
Linear and some nonlinear differential equations. Topics include existence theorems, stability, control theory, limit cycles, and applications to physics and ecology. Prerequisite: Math 139 and 123 or 124, or permission of instructor. (Spring)

153 **Introduction to Numerical Analysis** (3) — Staff
Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 33 or equivalent. (Fall, even years)

154 **Difference Equations** (3) — Staff
Introduction to finite difference equations and their solution. Physical examples and analogies with differential equations are employed to motivate and apply the techniques developed. Generating functions. Analysis of error and stability characteristics. Prerequisite: Math 111 or 139, or equivalent. (Spring, odd years)

157 **Introduction to Complex Variable Theory** (3) — Henney and Staff
Analytic functions. Power series. Contour integration and calculus of residues. Conformal mapping. Physical applications. Prerequisite: Math 139. (Spring)

168 **Seminar: Curriculum Studies** (3) — Bari and Staff
Open only to candidates for the degree of Master of Science for Teachers, teachers for in-service training or students recommended by the department of education. Critical examination of secondary school mathematics, curricula, techniques and programs. Prerequisite: Math 31 and permission of instructor.

181–82 **Seminar: Applied Mathematics** (3–3) — Glick and Staff
Prerequisite: Math 140, Stat 189–90, some knowledge of linear algebra, senior status as major in Applied Mathematics. (Academic year)

191 **Special Topics** (arr.) — Staff
Admission by permission of instructor. May be repeated for credit. Offered upon demand.

195 **Reading and Research** (arr.) Staff
Under the personal direction of an instructor. Limited to mathematics and applied mathematics majors with demonstrated capability. Prior approval of instructor required. May be repeated for credit. (Fall or spring)

Third Group

Courses marked with an asterisk (*) are offered every year.

ALGEBRA

*201–2 **Modern Algebra I and II** (3–3) Lec
(Formerly Graduate Algebra I and II)
Fundamental concepts of groups, rings, and fields. (Academic year)

203 **Modern Algebra III** (3) Staff
(Formerly Graduate Algebra III)
Galois theory and valuation theory. (Fall 1979 and alternate years)

204 **Representation Theory** (3) Lec
(Formerly Rings and Homology)
Representations of groups and algebras.

205 **Matrix Theory** (3) Kats
(Formerly Homological Algebra and Category Theory)
Topics chosen from the following: inequalities, non-negative matrices and their applications, infinite dimensional vector spaces, multilinear algebra, bilinear and quadratic forms.

206 **Topics in Algebra** (3) Staff
(Formerly Quadratic Forms I)

ANALYSIS AND APPLIED MATHEMATICS

*211 **Complex Analysis I** (3) Henney and Staff
(Formerly Group Theory I)
Topology of complex numbers; elementary functions; integrals; Cauchy's theorem; maximum modulus, Liouville's theorem; Taylor and Laurent series; classification of singularities; contour integration; the residue theorem; continuation, multivalued functions, and branch points. Prerequisite: advanced calculus. (Fall)

212 **Complex Analysis II** (3) Henney and Staff
(Formerly Group Theory II)
Harmonic functions, partial fractions. Mittag-Leffler theorem; entire functions, the Hadamard product theorem, the gamma function. Hurwitz's theorem, normal families of functions. The Riemann mapping theorem; analytic continuation, Riemann surfaces. Prerequisite: Math 211 or equivalent. (Spring)

213 **Applications of Complex Analysis** (3) Liverman and Staff
(Formerly Nonassociate Algebras)
Topics chosen from potential theory and conformal mapping, special functions, asymptotic expansions; steepest descent, stationary phase

and WKB methods, Fourier and Laplace transforms, Wiener-Hopf method, dual and singular integral equations. Prerequisite: Math 211 or an undergraduate course in complex variables. (Spring)

*214 **Measure and Integration Theory** (3) Junghenn
(Formerly Algebraic Number Theory)

Lebesgue measure and integration in abstract spaces. Probability measures. Absolute continuity; Radon-Nikodym theorem; measure on product spaces; Fubini theorem. L^p spaces. Prerequisite: advanced calculus. (Spring)

*215 **Introduction to Functional Analysis** (3) Taam
(Formerly Topics in Algebra)

Topological and metric spaces; Tychonoff theorem; completion of a metric space; Normed and Banach spaces; linear functionals and operators; Hahn-Banach theorem; principle of uniform boundedness; the closed-graph theorem and interior mapping principle; Hilbert spaces; eigenvalues, eigenvectors, invariant subspaces, and projection operators; operational calculus of functions defined on the spectrum. Prerequisite: advanced calculus. (Fall)

216 **Banach Algebras and Spectral Theory of Operators (3)** Taam
(Formerly Graph Theory)

Gelfand theory of commutative Banach algebras; function algebras, Stone-Cech compactification; application to the spectral theory of operators, spectral theorem for bounded and unbounded operators. Prerequisite: knowledge of measure and integration, introduction to functional analysis, and Tychonoff and Stone-Weierstrass theorem. (Spring 1979)

217 **Introduction to Ordinary Differential Equations** (3) Glick and Staff
(Formerly Mathematical Methods for the Social Sciences I)

First course in ordinary differential equations; existence and uniqueness of solutions; continuity of solutions with respect to initial conditions; properties of linear systems. Prerequisite: advanced calculus. (Spring 1979)

218 **Topics in Ordinary Differential Equations** (3) Staff
(Formerly Mathematical Methods for the Social Sciences II)

Topics to be chosen from stability theory, non-linear oscillations, equations with delays.

219–20 **Techniques of Partial Differential Equations I and II** (3–3)
(Math 220: Formerly Introduction to Modern Analysis)

Math 219: Linear first- and second-order equations. Applications to probability theory and mathematical physics. Prerequisite: knowledge of advanced calculus and rudiments of linear algebra and complex variables. Math 220: First-order equations and systems. Characteristics and bi-characteristics. Variational and transform methods. Integral equations and boundary-value problems. Prerequisite: Math 219, knowledge of undergraduate linear algebra and analytic function theory. 1979-80 and alternate years.

221 **Calculus of Variations** (3) Staff
(Formerly Introduction to Complex Analysis)

Introduction to the calculus of variations via the notion of the Fréchet derivative, the Euler equations, the Hamilton-Jacobi equa-

tions; sufficient conditions for a solution to exist, applications mechanics and physics, control theory.

*222–23 **Introduction to Numerical Analysis I and II** (3–3)
(Math 222: Formerly Applications of Complex Analysis; Math ... Formerly Advanced Complex Analysis)
Elements of theory and practice of numerical analysis using mod... digital computers; solution of linear systems and nonlinear equati... computation of eigenvalues and eigenvectors; basic approxima... theory; interpolation techniques; numerical quadrature; solution ... differential equations. Prerequisite: knowledge of advanced calcu... (Academic year)

224 **Generalized Functions and Operational Methods** (3) Liverm...
(Formerly Measure and Integration Theory)
Theory of Schwartz distributions. Operational calculus of gener... ized functions. Generalized function Fourier series, Fourier and ... place transforms, applications to initial and boundary-value proble... Prerequisite: advanced calculus. (Fall 1978)

225 **Theory of Generalized Functions and Distributions** (3) Liver...
(Formerly Introduction to Functional Analysis)
Fréchet and countable union spaces; structure, and properties ... Schwartz distributions and Gelfand-Silov generalized functions; ... plications to explicit solutions and existence theory of ordinary ... partial differential equations, nested Hilbert spaces; generali... Fourier transform. Prerequisite: Math 211 or permission of instr... St...

226 **Control Theory** (3)
(Formerly Banach Algebras and Special Theory of Operators)
Optimal control of linear systems, control of linear systems ... convex cost functionals, the maximal principle and selected ... on control systems.

227–28 **Introduction to System Theory I and II** (3–3)
(Math 227: Formerly Fourier Analysis on Locally Compact ... Math 228: Formerly Theory of Generalized Functions and Dis... tions)
Analysis of discrete and continuous systems of various types. Sta... and system dynamics and problems of control, optimization and ... bility. Prerequisite: background in advanced calculus and linear ... gebra.

229 **Mathematical Programming** (3)
(Formerly Ergotic Theory)
Simplex methods, including discussion of degeneracy. Duality the... applications to the transportation and assignment problems. ... linear programming, including dynamic and geometric programm... (Spring)

230 **Topics in Analysis** (3)
(Formerly Differential Equations in Banach Space)

231 **Topics in Applied Mathematics** (3)
(Formerly Semi-groups of Operators and Almost Periodic Functi...

232 **Topics in Numerical Analysis** (3)
(Formerly Seminar: Functional Analysis)

COMBINATORIAL MATHEMATICS

261 Combinatorics (3) — Bari
(Formerly Applied Linear Algebra)
Generating functions, recurrence relations, counting theorems. Selected topics. Prerequisite: undergraduate modern algebra and linear algebra. (Fall 1978)

262 Graph Theory (3) — Bari
(Formerly Linear Programming)
Selected topics in graph theory from introductory topics to problems currently of research interest.

263 Topics in Combinatorial Mathematics (3) — Staff

LOGIC

***271 Introduction to Mathematical Logic** (3) — Nelson
(Formerly Simulation of Discrete Stochastic Systems II)
Propositional and predicate calculus (first order): syntax, formation rules, semantics, axioms, proof and deduction, object vs. metalanguage, deduction theorem, compactness theorem, Gödel-Henkin completeness theorem, Craig's interpolation theorem, Beth's definability theorem. First-order recursive arithmetic: incompleteness and undecidability. (Fall)

272 Topics in Logic (3) — Nelson
(Formerly File and Data Management and Information Processing)
Selected topics from recursive function theory, model theory or set theory.

TOPOLOGY

***281–82 General Topology I and II** (3–3) — Green
(Math 281: Formerly Computability and Decidability; Math 282: Set Theory)
General topological spaces, separation axioms, compactness and connectedness. Metrization, uniform spaces, and complete spaces. (Academic year)

283–84 Topological Groups I and II (3–3) — Staff
(Math 283: Formerly Topics in Computational Complexity)
General theory of topological groups; uniform structures on groups, products and inverse limits. Locally compact groups, classical linear groups and Lie groups. Prerequisites: General topology including uniform spaces, linear algebra, and real and complex variables. Prerequisites: General topology including uniform spaces, linear algebra, and elementary group theory.

285–86 Topological Vector Spaces I and II (3–3) — Staff
(Formerly General Topology I-II)
Vector space topologies, linear manifolds, metrizability and complexification. Locally convex topological vector spaces, projective and inductive topologies, barrelled and bornological spaces. Prerequisites: General topology including uniform spaces, linear algebra, and real and real and complex variables.

287 **Differentiable Manifolds I** (3)
(Formerly Topological Vector Spaces I)
Differentiable manifolds, tangent vectors, sub-manifolds, imbeddi
and immersions, vector fields and differential equations on manifol
tensors and differential forms, Lie derivatives, orientability.

288 **Differentiable Manifolds II** (3)
(Formerly Topological Vector Spaces II)
Manifolds with boundary, integration on manifolds, Stoke's theo
and the divergence theorem, the Brouwer fixed-point theo
deKham groups, Riemannian manifolds, geodesics, curvature.

289 **Topics in Topology** (3)
(Formerly Topological Groups)

Fourth Group

*398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy ge
examination. May be repeated for credit. (Fall and spring)

*399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated
credit. (Fall and spring)

MICROBIOLOGY—GRADUATE PROGRAMS

Professors R. Hugh, E.M. Lerner II *(Research)*, L.F. Affronti *(Cha*
Professorial Lecturer D.H. Heilman
Associate Professors M. Reich, K. Huang, P.D. Kind, Y. Chu *(Researc*
Associate Professorial Lecturer R.F. DeGiovanni-Donnelly
Assistant Professor M.R. Loeb *(Research)*

Master of Science in the field of microbiology—Prerequisite: a b
degree with a major in biological or physical sciences from this Univers
an equivalent degree. The undergraduate program must have included the
lowing courses or equivalent: BiSc 11–12; Chem 11–12, 151–52, 153–54; Ma
31 (31 may be taken concurrently with the graduate program); Phys 1, 2
Required: the general requirements, pages 90–98. A total of 30 semester
is required, 24 hours of course work and six hours of thesis (Micr 299–300
course work must include Micr 211, 212 (if not taken prior to admission
Bioc 221–22; Micr 219–20, 277–78; and an approved biostatistics course. Th
maining academic work should consist of graduate-level courses selected
the approval of the instructor.

Doctor of Philosophy in the field of microbiology—Required: the genera
quirements, pages 90–92, 98–100. Candidates must fulfill the tool require
by completing an approved course in biostatistics and by passing a re
knowledge examination in French or German. The General Examination c
at least four fields, two of which must be in microbiological disciplines.
Research fields: clinical microbiology, determinative bacteriology, imm
chemistry, immunology, microbial genetics, microbial pharmacology, micr
physiology, and virology.

211 **Microbiology** (4)
Survey of bacteria, viruses, rickettsiae, fungi, parasites, and im
logical concepts. Prerequisite or concurrent registration: Bioc 2

or other biochemistry course, and permission of instructor. Laboratory fee, $20. (Fall)

212 **Pathogenic Bacteriology** (3) Hugh

Principles of bacteriology and pathogenic characteristics of bacteria with emphasis on pathogenesis, prevention, and control of bacterial diseases of man. Prerequisites: Micr 211 or equivalent. Laboratory fee, $20. (Spring)

214 **Tissue Cell Culture and Somatic Variation** (3) Staff

(Formerly 4 credits)

Techniques of tissue culture and means of studying somatic variations. Prerequisite: Micr 211 or equivalent. (Spring)

215 **Medical Parasitiology** (2) Staff

Study of host-parasite relationships. Clinical recognition of important parasites in medicine. (Fall)

219 **Scientific Writing for Graduate Students** (1) Staff

Required of all graduate students prior to writing a thesis or dissertation. Some research experience required. (Fall)

225 **Microbial Physiology I** (3) Reich, Affronti

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 221–22, Micr 211, or equivalent. (Fall)

226 **Microbial Physiology II** (3) Reich, Affronti

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

229 **Immunology** (3) Kind, Affronti

Lecture course. Fundamental immunologic concepts. Antigens, antibodies, antigen-antibody reactions *in vitro* and *in vivo*, and the immune response. Prerequisite: Micr 211 or permission of instructor. (Fall)

230 **Immunology Laboratory** (2) Kind, Affronti

Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite or concurrent registration: Micr 229 or permission of instructor. Laboratory fee, $20. (Fall, odd years)

231 **Immunobiology** (1) Affronti, Kind

Study of immunological functions of reticulo-endothelial tissues, theories of auto-immunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. Clinical faculty discuss relevant aspects of immunobiology. Prerequisite: Micr 201* or 229, and permission of instructor. (Fall)

233 **Virology** (3) Huang

Biochemical, genetic, and pathogenic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Virology—Laboratory** (2) Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee, $20. (Fall)

* For description of Micr 201 see the *School of Medicine and Health Sciences Bulletin*.

235 Systematic Bacteriology (2)
History of bacterial classification, international rules of bacter nomenclature, development of bacterial classification based on re tionships, characteristics of bacterial groups. Prerequisite: Micr or equivalent. (Fall, odd years)

***240–41 Biomedical Instrumentation (4–4)**
Same as Bioc 225–26 and Phys 223–24. Comprehensive study of th retical and practical application of biomedical instrumentation to separation, identification, and quantification of materials of inter to biomedical scientists. Laboratory fee, $50. (Academic year)

251 Clinical Laboratory Bacteriology (3)
For graduate students; open to medical students. Detection identification of bacterial agents which cause diseases in huma Comparative isolation and identification methods; emphasis on terpretation and significance of laboratory observations. Prerequis Micr 212 or equivalent. (Fall, even years)

255 Clinical Virology (1)
General principles of virology; emphasis on clinical situations. Pr requisite: Micr 212 or equivalent. (Fall)

257 Experimental Immunochemistry (3)
Biochemical and physiochemical characterization of antigens antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 229. Labo tory fee, $20. Limited enrollment. (Spring, even years)

258 Microbial Genetics (2)
Survey of microbial systems that depict basic concepts of genet principles. Prerequisite: Micr 211 or equivalent. (Spring)

260 Cellular Immunology (1)
Advanced seminars in cellular aspects of the immune response tent differs each time course is offered. May be repeated for credit Prerequisite: Micr 229. (Spring)

277–78 Seminar: Microbiology (1–1)
Required of graduate students. (Academic year)

293 Special Topics in Microbiology (arr.)
Selected topics in microbiology. May be repeated for credit. and spring)

295 Research in Microbiology (arr.)
Content differs each time the course is offered; may be repeated credit. (Fall and spring)

299–300 Thesis Research (3–3)
(Fall and spring)

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Philosophy ge examination. May be repeated for credit. (Fall and spring)

* An interdisciplinary course offered by the Biochemistry, Microbiology and Physiology partments.

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

MUSEUM STUDIES—GRADUATE PROGRAM

Committee on Museum Studies

J.C. Anderson, A.D. Andrews, V.K. Golla, R.L. Humphrey (*Chairman*), B. Mergen, R.K. Packer, C. Rose

The Graduate School of Arts and Sciences offers an interdepartmental program leading to the degree of Master of Arts in the field of museum studies. This program provides students with a broad background in museum studies, including a variety of specialized approaches to a museum career with concentration in conservation, collections management, exhibiting, administration, and museum education. An interdisciplinary committee, composed of members drawn from several departments of the University and from the Smithsonian Institution, administers the program under Graduate School supervision.

The program is designed primarily to prepare students to work with historical and scientific collections. Students whose principal career interests are in art collections and galleries should apply for candidacy in the program for the Master of Arts in the field of art history with a concentration in museum training, offered by the Art Department. Programs for the degree of Master of Arts with concentrations in museum training are also offered by the Anthropology Department and the American Studies Program.

Students applying for candidacy in the Museum Studies Program must meet all general requirements for admission to the Graduate School of Arts and Sciences, including a baccalaureate degree with a major, or its equivalent, in anthropology, art history, American studies, or natural science. In addition, the student should have taken at least six credit hours in each of these fields and at least nine credit hours in one of them, other than the student's undergraduate major, or must show equivalent preparation. There are additional prerequisites for specialization in ethnographic or archeological conservation.

Master of Arts in the field of museum studies—Required: the general requirements, pages 90–98. The degree requires a minimum of 42 hours of course work. At least 15 hours are to be devoted to courses in the museum field, and a further six to 12 hours may be in museum internship. The remaining hours should be in the core discipline or in one or more related disciplines. The student must pass a comprehensive examination based on course work and submit a research paper of publishable quality. In addition, students must pass a reading examination in an approved foreign language, or may substitute an approved course in statistics or computer programming. For those specializing in ethnographic conservation, organic chemistry may be substituted.

AMERICAN CIVILIZATION

250 *Orientation Course: Material Aspects of American Civilization*
251–52 *Museum Research and Education*
270 *Seminar: Museum Exhibiting*
294 *Field Research in Historical Archeology*

ANTHROPOLOGY

211 Problems in Conservation
212 Advanced Conservation Techniques
264 Seminar: Museum Techniques
270 Seminar: Museum Exhibiting
290 Advanced Museum Research
291 Seminar: Museology
292 Introduction to Conservation
293 Conservation Laboratory Techniques

ART

129–30 Principles of Museum Work
201–2 Museum Projects
209–10 Exhibition and Display Design
213 Museum Administration and Government
214 Museum Administration and Trusteeship
217–18 Problems in Museum Work
271–72 Museum Techniques
292 Introduction to Conservation

EDUCATION

310 Museum Studies
311 Museum Audiences
312 Internship in Museum Education

MUSIC

Professor G. Steiner *(Chairman)*, R. Parris
Associate Professor N.A. Tilkens
Adjunct Assistant Professor M.C. Tolson *(Piano)*
Assistant Professorial Lecturers R.J. Guenther, B. Feinstein, A.T. Racha
Studio Lecturers in Applied Music S.K. Kim *(Piano)*, M. McNabb *(Pia*
and Organ), M. Peris *(Piano)*, C.A. Russell *(Piano)*, C.O. Dash *(Voi*
S.H. Prussing *(Voice)*, J.E. White *(Voice)*, R. Parnas *(Violin and Vio*
R.A. Norris *(Guitar)*, R.C. Raffaelle *(Guitar)*, D.C. Jarvinen *(Cello)*,
Martin, Jr. *(Cello)*, N.M. Irvine *(Bass)*, W.E. Fuhrman *(Flute)*, W
Mann *(Flute)*, T.P. Perazzoli *(Flute)*, R.O. White *(Oboe)*, W.R. Wrig
(Clarinet and Saxophone), L. Lipnick *(Bassoon and Recorder)*, S
Ramsay *(French Horn)*, G.W. Recker *(Trumpet)*, R.H. Kraft *(Trombo*
and *Recorder)*, T.H. Wardlow *(Percussion Instruments)*, B.R. Seidm
(Harp), M.K. Kuper *(Flute)*, M.C. Sislen *(Guitar)*, A. Lee *(Voice)*,
Gieseler *(Voice)*, J.P. Ramo *(Guitar)*, E.M. Guenther *(Organ)*

Bachelor of Arts with a major in music history and literature, theory, theo
or applied music (departmental)—The following requirements must be fulfil
1. The general requirements as stated on pages 74–75, 80–87.

2. Prerequisite courses—Mus 2, 5–6, six hours of applied music lessons, a minimum of four semesters in music ensemble groups (or evidence of equivalent experience).
3. Required courses in related areas (except for music therapy)—12 hours of one foreign language (French, German or Italian recommended).
4. Required courses in the major—Mus 103–4, 131–32; six additional hours of music theory courses; six additional hours of music history and literature courses; plus six hours of courses in the area of the major. (Music theory majors must meet departmental requirements for proficiency in piano; applied music majors must perform a complete public recital or the equivalent in major solo performances; music therapy majors must follow an assigned curriculum of courses.)

Master of Arts in the field of musicology—Prerequisite: a bachelor's degree with a major in music, or an equivalent degree.
Required: the general requirements, pages 90–98. The program of study consists of 30 semester hours of course work including a thesis (six semester hours).

Master of Music in the field of music theory, music composition, conducting, or applied music—Prerequisite: a bachelor's degree with a major in music or an equivalent degree.
Required: the general requirements, pages 90–98. The required second- and third-group course work is as follows:
1. *In the field of music theory*—Thirty semester hours of course work including a thesis (six semester hours) demonstrating research ability in theoretical, creative, or analytical techniques.
2. *In the field of music composition*—Thirty semester hours of course work including a creative thesis of one composition in large form properly prepared for performance (chamber music, a symphonic form, or a choral work with orchestral accompaniment) including a written theoretical, formal, and harmonic analysis of the work.
3. *In the field of conducting*—Thirty semester hours of course work including a thesis (six semester hours) demonstrating research ability in theoretical, creative, or analytical techniques. The requirements also include an acceptable public conducting performance.
4. *In the field of applied music*—Thirty semester hours distributed as follows: (a) 12 semester hours of applied music in the area of concentration; (b) 12 semester hours of music theory and music history and literature courses; and (c) a thesis (six semester hours). The thesis consists of a public recital and performance before a designated committee (such a recital and performance must be representative of an extensive and well-rounded repertory, performed on a professionally accepted artistic level), and delivery of an historical and analytical lecture on the musical content of the program; demonstrated leadership in an ensemble performance (opera or oratorio for voice); and a written report on some approved theoretical area related to the student's concentration.

Bachelor of Arts in Education with a teaching field in music—Prerequisite: the education curriculum, pages 113–14.
Required: the music option and professional courses listed on page 117.

MUSIC HISTORY AND LITERATURE

First Group

3 Introduction to Musical Understanding (3) Steiner, Tilkens
Introductory history of musical styles, related to listening; study of music materials and media. (Fall and spring)

4 **Survey of Music Literature** (3) Steiner
Introductory study of musical forms, structures, and textures; aural analysis of selected literature. (Spring)

7 **Music of Nonwestern Cultures** (3) Tilkens
Introductory survey of the basic systems and styles of music in the major cultures of the Eastern Hemisphere and Africa. (Fall)

8 **History of Jazz** (3) Staff
Introduction to the styles, composers, and performers of jazz music from its origins to the present.

Second Group

103–4 **History of Music** (3–3) Tilkens
Development of music in the Western World from the early Christian Era to the present. (Academic year)

105 **Music of the Baroque Period** (3) Tilkens
Study of the musical styles, techniques, and literature from 1600 to 1750. (Fall)

106 **Music of the Classic Period** (3) Tilkens
Study of styles, techniques, and literature from the 18th century schools through Haydn, Mozart, and Beethoven. (Spring)

107 **Music of the Romantic Period** (3) Guenther
Study of the musical styles, backgrounds, and literature from Schubert through the 19th century. (Spring)

108 **Music of the 20th Century** (3) Steiner
The principal schools, techniques, developments, and trends of the 20th century. (Fall)

109 **Orchestra Literature** (3) Steiner
Survey of the history and styles of orchestra literature, analysis of representative works.

110 **Chamber Music Literature** (3) Steiner
Survey of the history and styles of chamber music literature, analysis of representative works. (Summer)

121 **The Opera** (3) Feinstein
Survey of the history and styles of opera, analysis of representative works. (Spring)

125 **Keyboard Music Literature** (3) Tilkens
Survey of the history, style, and major content of the keyboard literature from the 16th century to the present.

140 **Music Therapy** (3) Rachal
Introduction to principles and goals of music therapy. (Fall)

141 **Techniques of Music Therapy** (3) Rachal
(Spring)

142 **Psychology of Music** (3)

143–44 **Seminar: Clinical Training in Music Therapy** (3–3) Rachal

173 **Piano Pedagogy** (3) **Tolson**
Principles, materials, and methods of piano teaching.

199 **Independent Research** (3) **Staff**
Under the guidance of an assigned instructor. Open only to qualified music majors. May be repeated for credit. (Fall and spring)

Third Group

203 **Bibliography and Research Methodology** (3) Guenther
(Fall)

234 **Seminar: Performance Practices in Selected Areas** (3) Staff

238 **Seminar: Analytical Studies in Music History** (3) Parris, Guenther
Topic for 1978: Mozart's piano concerti. Topic for 1979: Mahler. (Fall and spring)

239 **Independent Research** (3) **Staff**

MUSIC THEORY

First Group

1 **Elements of Music Theory** (3) **Staff**
Notation, scales, keys, intervals, terms, rhythms, and chord structure. (Fall and spring)

2 **Ear-training** (3) **Staff**
Melodic and harmonic dictation, ear-training, sight-singing, elementary keyboard harmony. (Spring)

5–6 **Harmony** (3–3) Guenther
Triads, inversions; chord analysis, construction, and progression; part-writing, modulations, altered chords. Prerequisite: Mus 1 or satisfactory passing of placement examination. (Academic year)

Second Group

131–32 **Advanced Theory** (3–3) **Parris**
Practice in 16th century contrapuntal writing and analysis, chorale preludes, inventions, and fugues. Prerequisite: Mus 5–6 or equivalent. (Academic year)

135 **Counterpoint** (3) **Parris**
Study and practice of 16th century contrapuntal techniques. (Spring)

137 **Orchestration** (3) **Parris**
Instrumental scoring. (Fall)

138 **Form and Analysis** (3) **Parris**
Analysis of musical forms in representative musical literature. (Spring)

151 **Conducting** (3) — Steine
Technique of conducting, score reading, rehearsal procedures, analysis, and interpretation of selected musical literature; practice in conducting. (Spring)

160 **Electronic Music** — Staff
Tape and electronic techniques, synthesizer use, and acoustical principles. (Spring)

Third Group

231–32 **Composition** (3–3) — Parnas
May be repeated for credit. (Academic year)

237 **Seminar: Analytical Studies in Music Theory** (3) — Guenther
(Fall)

251–52 **Advanced Conducting** (3–3) — Steiner
(Spring)

299–300 **Thesis Research** (3–3) — Staff
(Fall and spring)

APPLIED MUSIC

All applied music courses may be repeated for credit.

All applied music courses are offered both fall and spring.

Mus 51, 52, 53, 54 and 55 do not include individual lessons and do not require a supplementary fee. All other applied music courses include individual lessons and require a supplementary fee, as follows:

1. One-semester-hour courses: individual lessons of one-half hour a week, supplementary fee, $75.
2. Three- or six-semester-hour courses: individual lessons of one hour a week, supplementary fee, $100.

Supplementary fees for applied music courses are nonrefundable after the first three weeks of the fall and spring semesters. Supplementary fees are different for courses offered during the summer sessions. Consult the Music Department for details.

The supplementary fee is waived for graduate degree candidates in music and full-time undergraduate music majors.

First Group

Required practice: three hours a week for one-semester-hour courses and six hours a week for three-semester-hour courses. In addition, three-semester-hour courses include assigned workshops in theory and performance.

11 **Piano** (1) — Staff
12 **Piano** (3) — Staff
13 **Voice** (1)
14 **Voice** (3)
15 **Organ** (1) — McNabb, E. Guenther
16 **Organ** (3)
17 **Violin** (1) — Steiner, Parnas
18 **Violin** (3)

19 **Classical Guitar** (1)	Staff
20 **Classical Guitar** (3)	
21 **Viola** (1)	Parnas
22 **Viola** (3)	
23 **Cello** (1)	Martin, Jarvinen
24 **Cello** (3)	
25 **Bass** (1)	Irvine
26 **Bass** (3)	
27 **Flute** (1)	Perazzoli, Fuhrman, Kuper
28 **Flute** (3)	
29 **Recorder** (1)	Kraft, Lipnick
30 **Recorder** (3)	
31 **Oboe** (1)	R. White
32 **Oboe** (3)	
33 **Clarinet** (1)	Wright
34 **Clarinet** (3)	
35 **Saxophone** (1)	Wright
36 **Saxophone** (3)	
37 **Bassoon** (1)	Lipnick
38 **Bassoon** (3)	
39 **French Horn** (1)	Ramsay
40 **French Horn** (3)	
41 **Trumpet** (1)	Recker
42 **Trumpet** (3)	
43 **Trombone** (1)	Kraft
44 **Trombone** (3)	
45 **Percussion** (1)	Wardlow
46 **Percussion** (3)	
47 **Harp** (1)	Seidman
48 **Harp** (3)	
49 **Tuba** (1)	Kraft
50 **Tuba** (3)	

51 **Orchestra** (1) — **Steiner**

Preparation and performance of orchestral literature. Prerequisite: audition before director. (Fall and spring)

52 **Instrumental Ensemble** (1) — **Steiner**

Chamber ensemble groups approved by audition. (Fall and spring)

53 **Chorus** (1) — **Prussing**

Preparation and performance of choral literature. Prerequisite: audition before director. (Fall and spring)

54 **Chamber Choir** (1) — **Prussing**

Small vocal groups and chorus participation. Prerequisite: audition before director. (Fall and spring)

55 **Band** (1) — **Staff**

Concert band, stage band and brass ensemble. (Fall and spring)

Second Group

Departmental prerequisite: Audition to meet departmental requirements.
Required practice: six hours a week for one-semester-hour courses and 12

hours a week for three-semester-hour courses. In addition, three-semester-hour courses include master performance classes and recital preparation.

111 **Piano** (1)	Staff
112 **Piano** (3)	Staff
113 **Voice** (1)	
114 **Voice** (3)	Staff
115 **Organ** (1)	
116 **Organ** (3)	Staff
117 **Orchestral Instrument** (1)	
118 **Orchestral Instrument** (3)	Staff
119 **Classical Guitar** (1)	
120 **Classical Guitar** (3)	

Third Group

Required practice: 12 hours a week for three-semester-hour courses and 1[illegible] hours a week for six-semester-hour courses. In addition, six-semester-hour courses include supervised ensemble preparation and required concert solo performances.

211 **Piano** (3)
212 **Piano** (6)
213 **Voice** (3)
214 **Voice** (6)
215 **Organ** (3)
216 **Organ** (6)
217 **Orchestral Instrument** (3)
218 **Orchestral Instrument** (6)

PATHOLOGY—GRADUATE PROGRAMS

Professors H. Sidransky *(Chairman)*, F.N. Miller
Associate Professors S.G. Kent, B.C. Zook *(Comparative)*, Y. Al-Doory, F.F. Abramson

Programs of study leading to the degree of *Associate in Science (Medical Laboratory Technique)* are described in the *School of Medicine and Health Sciences Bulletin*.

Master of Science in the field of mycology—Prerequisite: a bachelor's degree with a major in biology, botany, chemistry, or zoology from this University, or an equivalent degree. The undergraduate program should have included the following courses or their equivalent: BiSc 11-12 *Introductory Biology for Science Majors* (4–4); Chem 11–12 *General Chemistry* (4–4), 151–52 *Organic Chemistry* (3–3), 153–54 *Organic Chemistry Laboratory* (1–1).

Required: the general requirements, pages 90–98. Candidates must complete 24 hours of course work plus 6 hours of thesis (Path 299–300). With the approval of the advisor and the Graduate School, candidates may take 36 hours of course work without a thesis. Candidates admitted to a non-thesis program are required to take Bioc 221–22. The remaining academic work must consist of graduate-level courses selected with the approval of the advisor.

Doctor of Philosophy in the field of pathology—Prerequisite: one of the following degrees from a recognized professional school: Doctor of Medicine

(M.D.), Doctor of Veterinary Medicine (D.V.M.), or Doctor of Dentistry (D.D.S.). In exceptional cases, applicants with other backgrounds in the life sciences may be accepted.

Required: the general requirements, pages 90–92, 98–100, including 48 semester hours of approved graduate course work. One year of experience in pathology at the University Hospital, equivalent to Path 283, may be counted for a maximum of 24 semester hours of graduate course work. Other experience must satisfy the eligibility requirements of the appropriate national certifying body, i.e., the American Board of Pathology in the case of the M.D., the American College of Veterinary Pathologists in the case of the D.V.M. and the American Board of Oral Pathology in the case of the D.D.S.

Research *fields*: comparative pathology, human pathology, ophthalmic pathology, and veterinary pathology.

Third Group

203–4 Pathology (4–4) — **Staff**

General introduction to concepts of disease. Pathology of organ systems; correlation with symptoms and physical signs. Gross and microscopic study of diseased tissues. Case studies. Limited enrollment. Prerequisite to Path 203: Anat 202, 203, 204, 205; or equivalent. Prerequisite to Path 204: Path 203. (Academic year)

***205 Comparative Pathology I (3)** — **Zook**

An introduction to the study of disease in vertebrates, comparison with disease in man. Mechanisms by which various agents provoke illness; body defensive reactions. Illustration of common diseases of various species, including material from captive wild animals. Recommended: courses in antomy, histology, and physiology.

†210 Comparative Pathology Laboratory (2) — **Zook, Montali‡**

Participation in an autopsy service involving captive wild animals and comparison of diseases in various animal species with those in man. Limited to 4 students. Path. Lab., Nat'l. Zoological Park. (Fall)

†215 Perinatal Pathology Laboratory (2) — **Kent**

Special assignments for dissection and study. (Fall)

220 Medical Mycology (2 or 4) — **Al-Doory**

Study of pathogenic fungi, mycotic diseases and their clinical aspects. (Fall)

221 Medical Mycology Laboratory (1) — **Al-Doory**

Laboratory complement to Path 220. Prerequisite or concurrent registration: Path 220. Laboratory fee, $20. (Fall)

222 Opportunistic Mycoses (2) — **Al-Doory**

Study of the opportunistic fungal infections and their serological, clinical, and therapeutic aspects. Emphasis on identification of fungi and evaluation of laboratory findings. (Spring)

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* An interdepartmental course offered by the departments of pathology and biological sciences.
† Open to limited number of graduate students, with permission.
‡ Dr. Richard Montali is Assistant Clinical Professor of Pathology at the G.W.U. School of Medicine and Health Sciences.

272–73 **Seminars in Mycology** (1–1) Al-Doory
Conferences and discussions on current topics and latest developments in medical mycology. May be repeated for credit. (Academic year)

275 **Research in Mycology** (2 to 4) Al-Doory
Participation in experimental studies in mycotic diseases. Research in laboratory medicine on topics related to medical mycology. May be repeated for credit. (Fall and spring)

*277 **Anatomic Pathology Clerkship I** (arr.) Staff
A practical course in gross human anatomy and pathology. Prerequisite: Anat 201 or equivalent. Students may spend up to 24 weeks full-time on the necropsy and surgical pathology services, receiving one semester hour of credit for each four-week period. Univ. and V.A. hosps. (Spring)

*281 **Anatomic Pathology Clerkship II** (arr.) Staff
A practical course in gross and microscopic human pathology. Prerequisite: Path 203–4 or equivalent. Students spend up to 24 weeks full-time, or the equivalent part-time, on the necropsy and surgical pathology services, receiving one semester hour of credit for each four-week full-time period. Univ. and V.A. hosps. (Spring)

*283 **Anatomic Pathology Clerkship III** (arr.) Staff
Necropsy and surgical pathology service. Prerequisite: Path 203–4 or equivalent. Five semester hours of credit for each four-week period. Students may receive up to 30 semester hours of credit for six months full-time. (Fall or spring)

*295 **Comparative Pathology II** (arr.) Zook, Casey,† Montali
Participation in veterinary pathology service, including wild and domestic animals. Prerequisite: Path 203–4 or equivalent. Five semester hours of credit for each four-week period. Students may receive up to 30 semester hours of credit for six months full-time. Path. Lab., Nat'l. Zoological Park, and Armed Forces Inst. of Path. (Fall or spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

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* Open to limited number of graduate students, with permission.
† Dr. Harold Wilton Casey is Clinical Professor of Pathology at the G.W.U. School of Medicine and Health Sciences.

PHARMACOLOGY—GRADUATE PROGRAMS

Professors H.G. Mandel *(Chairman)*, V.H. Cohn, P. Mazel, R. Hertz *(Research)*, S.E. Fabro *(Research)*, J.A. Straw
Professorial Lecturers F.E. Hahn, J. Axelrod, E. Costa, R. Fischer
Associate Professors P. Klubes, F.P. Abramson
Assistant Professors A.M. Suria, R.J. Anderson
Special Lecturer J. Silvio

Master of Science in the field of pharmacology—Prerequisite: a Bachelor of Arts or Bachelor of Science degree. The undergraduate program must have included the following courses, or equivalent: BiSc 11–12; Phys 1, 2; Chem 11–12, 22, 151–52, 153–54. One year of calculus and a course in physical chemistry are also recommended, but these may be taken during the work toward the master's degree.

Required: the general requirements, pages 90–96, including Bioc 221–22; Phyl 201, 212; Phar 203, 205–6, 299–300.

Doctor of Philosophy in the field of pharmacology—Required: the general requirements, pages 90–92, 98–100.

Research fields: biochemical pharmacology, cancer chemotherapy, carcinogenesis, developmental pharmacology, endocrine pharmacology, molecular pharmacology, neuropharmacology, pharmacology of drug abuse, and physiological disposition of drugs.

Second Group

114 Drugs and the Consumer (3) Cohn and Staff

General concepts of drug action in the body. Action mechanism of some specific prescription and nonprescription drugs, including contraceptives; tranquilizers and sleep-inducing drugs; hayfever, headache, and cold remedies; analgesics; antibiotics; vitamins. Issues related to development and marketing of drugs, drug safety, drug advertising, generic versus tradename drugs, drug use in sports, drug use during pregnancy, smoking and health. No science prerequisites. Limited enrollment. (Fall)

115 Drug Abuse Education (3) Cohn and Staff

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems; legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana, and hallucinogenic and psychedelic drugs. No science prerequisites. (Spring)

Third Group

203 Fundamental Principles of Pharmacology (3) Cohn and Staff

Basic principles of pharmacology, including drug receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. Admission by permission of the instructor. (Fall)

205–6 Pharmacology (arr.) Cohn and Staff

Lectures, laboratory, conferences on interaction of drugs and bio-

logical systems as a basis of rational disease therapy. Prerequ... Phar 203, courses in biochemistry and physiology, or approv... department. Prerequisite to Phar 206: Phar 205. (Fall)

215 **Adolescent Drug Abuse** (3) Cohn and St...
Offered off campus through the College of General Studies. ... marily for teachers, counselors, and school administrators. Ma... disciplinary lectures and discussions concerning the physiolog... and psychological effects of narcotics, central nervous system sti... lants and depressants, alcohol, and hallucinogenic and psyched... drugs; psychosocial factors leading to adolescent drug abuse. ... implications of drug abuse; prevention, control, and treatmen... drug abuse. (Fall and spring)

254 **Frontiers in Pharmacology** (1) Mazel and St...
Recent advances and research in pharmacology. Presentation... laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2 or 3)
Current theory on drug actions, especially chemotherapeutic agen... at molecular level. Effect of drugs on biosynthetic processes of ... cell with respect to DNA, messenger RNA, transfer RNA, ribosome... protein, cell wall, and intermediary metabolites. Factors which ... action of drugs, such as drug interactions and resistance. (Spri...

258 **Cancer Chemotherapy** (1) Mandel and St...
Mechanisms by which drugs inhibit the growth of tumor ce... (Spring, even years)

260 **Endocrine Pharmacology** (1) Hertz and St...
Lectures and seminars on recent advances in the pharmacology a... mechanisms of action of various hormones. (Spring, odd years)

267 **Pharmacological Research** (arr.)
Research with staff members. May be repeated once for ... toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Mazel and Staff
Recent advances in pharmacology. Content differs each time ... course is offered; may be repeated once for credit. (Fall a... spring)

272 **Physiological Disposition of Drugs** (3)
Fate of drugs in biological tissue. Absorption, distribution, chem... alteration, excretion of drugs; physical, chemical, and biological ... tors affecting these processes. Prerequisite: Phar 205–6 or permis... of the instructor. (Spring, even years)

275–76 **Advanced Topics in Pharmacology I-II** (1–1) Anderson and ...
Lectures and seminars on advances in mechanisms of drug a... pharmacology of new drugs, theoretical aspects of pharmacol... laboratory techniques. (Academic year 1979–80 and alter... years)

277–78 **Advanced Topics in Pharmacology III-IV** (1–1) Anderson and ...
Continuation of Phar 275–76. (Academic year 1978–79 and ... nate years)

279 **Special Topics in Pharmacology** (arr.) **Staff**
Selected aspects of drug action. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

280 **Neuropharmacology** (2) **Suria and Staff**
Fundamental principles. Electrophysiological and biochemical techniques. Neurotransmitters and their pathways in the central nervous system. Drug effects on neurotransmitter pathways. Biochemical basis of mental disease. Prerequisite: Phar 205-6 or equivalent. (Spring, odd years)

295 **Reading and Research** (arr.) **Staff**
Independent study for students preparing for the Master of Science degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**
(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

PHILOSOPHY

Professors T.Z. Lavine, R.H. Schlagel *(Chairman)*
Associate Professors C.H. Pfuntner, W.B. Griffith, R.S. French
Assistant Professor R.P. Churchill

Bachelor of Arts with a major in philosophy (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the social studies and the natural and mathematical sciences.)
2. Required courses in related areas—six semester hours of literature courses selected from Chinese, Classics, English, French, German, Italian, Slavic or Spanish (Clas 71, 72, or Engl 191–92 recommended); six hours selected from art history, music history or religion; six hours in history (Hist 39–40 recommended).
3. Required courses in the major—Phil 111, 112, 113; nine semester hours selected from Phil 121, 131, 151, 152, 198; six semester hours selected from Phil 172, 192, 193; plus six additional semester hours of second-group philosophy courses.

For students expecting to continue in graduate school, it is recommended that they include in their program of study 12 semester hours of introductory French, German or Greek language courses.

Master of Arts in the field of philosophy—Prerequisite: a bachelor's degree with an undergraduate major in philosophy at this University, or an equivalent

degree. The undergraduate program should have included the following cou
or their equivalent: Phil 111, 112, 113, 121, 131, and 152.

Required: the general requirements, pages 90–98. The program of st
consists of a minimum of 30 semester hours of second- and third-group cou
with or without a thesis. A Master's Comprehensive Examination is requ
in two areas of philosophy: the history of philosophy; problems of philoso
and contemporary philosophy. Candidates must pass a reading knowledge
amination in French, German or Greek.

*Master of Arts in Special Studies with an area of concentration in philoso
and social policy*—An interdisciplinary program which brings the normat
historical, and analytical-logical skills of philosophical inquiry to bear u
contemporary problems of social policy. Prerequisite: a bachelor's degree fr
an accredited college or university. Students are expected to have comple
the prerequisites to graduate courses.

Required: the general requirements, pages 90–98. Two options are availa
(1) a minimum of 24 semester-hours of approved graduate course work
the successful completion of a thesis, or (2) a minimum of 36 semester-h
of graduate course work which does not include a thesis. Phil 195, 198,
and 272 are required for all students. Phil 299–300 is required for studen
electing to write a thesis. The remainder of the course work in both opti
must include a majority of approved courses in the arts and sciences w
no more than one-third taken in any one department. Other courses may
selected from Chinese, Classics, English, French, German, Italian, Slavic
selected from the School of Education and Human Development, School
Government and Business Administration, and School of Public and Inter
tional Affairs. Each candidate must pass a Master's Comprehensive Exami
based on the particular interdisciplinary composition of the student's progr
of study. Prospective candidates should consult Professor Roderick French, d
rector of the program.

First Group

45 Introduction to Logic (3)
Deduction, induction, and legal reasoning; emphasis on recognition
of fallacies and practical applications of logic. (Spring)

50 Introduction to Philosophy (3)
Readings from major philosophers and study of philosophic p
tions from Plato to Sartre. (Fall and spring)

71 Philosophy and Literature (3)
Philosophical foundations of psychoanalytical psychiatry, existentia
ism, and Marxism and their expression in literature, e.g., in
works of Mann, Kafka, Camus, Sartre, Hesse, Gide, and Koes
(Spring)

***91 East Asia—Past and Present** (3) Johnson and Associated Fac
An interdisciplinary course, introducing the student to a compreh
sive and integrated understanding of the civilization and pro
problems of East Asia.

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* An interdepartmental course offered by the Philosophy, East Asian Languages and Literatu
Economics, Geography and Regional Science, History, Political Science, and Religion Dep
[illegible].

Second Group

111 **History of Ancient Philosophy** (3) **Pfuntner**
History of Western philosophy from early Greece to the early Middle ages. (Fall)

112 **History of Modern Philosophy** (3) **Churchill**
History of Western philosophy of the 17th and 18th centuries (Descartes to Kant). (Spring)

113 **19th-Century Philosophy** (3) **Lavine**
European philosophy from Kant to German Romanticism, Fichte, Hegel, Kierkegaard, Schopenhauer, and Nietzsche. (Fall)

121 **Symbolic Logic** (3) **Griffith**
Systematic study of the principles of valid inference with attention to the development of skill in logical analysis and evaluation of arguments, and to the elementary theory of formal systems. (Fall)

*127 **Theories of History** (3) **Lavine**
Major philosophies of history: Judeo-Christian, linear progressive, historicist, Hegelian-Marxian dialectical, cyclical (Vico, Spengler, Toynbee), and social-scientific (Comte, Weber). Contemporary problems of historical knowledge. (Fall)

131 **Ethics** (3) **Griffith**
Main types of ethical theory: egoistic, utilitarian, self-realization, conscience, existentialism. Applications to contemporary problems. (Spring)

132 **Social Philosophy** (3) **Lavine**
Social philosophies from Locke to contemporary theorists. (Spring)

133 **Philosophy, Nonviolence, and the Problem of War** (3) **Churchill**
Problems of war in relation to morality; theories of human aggression and violence; nonviolence and pacificism as alternatives to war; doctrine of just war. (Summer)

142 **Philosophy of Law** (3) **Churchill**
Systematic examination of fundamental concepts of law and jurisprudence; special emphasis on the relationship between law and morality. (Fall)

151 **Myth, Science and the Modern Mind** (3) **Schlagel**
Comparison of the mythical and scientific outlook; emphasis on the development and nature of scientific concepts, methodology, and explanation from Copernicus to Einstein. (Fall)

152 **Knowledge, Truth and Reality** (3) **Schlagel**
Inquiry into the basis and structure of knowledge, the problem of perception and independent reality, and the meaning and criteria of truth. (Spring)

* An interdepartmental course offered by the Philosophy and History Departments.

162 **Aesthetics** (3) Pfun
Nature of aesthetic experience, problems of appreciation and c
cism in the arts, and theories of artistic creation. (Spring)

172 **American Philosophy** (3) Pfun
Philosophies of Peirce, Royce, James, Dewey, and Santayana
representatives of American thought. (Fall)

192 **Contemporary Philosophy: Analytical** (3) Churc
The two dominant movements of recent Anglo-American philoso
logical positivism and British ordinary language philosophy
represented by Russell, G. E. Moore, Wittgenstein, Ryle, Ayer,
(Fall)

193 **Contemporary Philosophy: Phenomenological** (3) Gri
The phenomenological movement, including its development
German and French existentialism, and its more recent ph
(Spring)

195 **Man and Nature in Public Policy** (3) Fre
Relation of philosophical conceptions of man and nature to natio
policies of growth and development in selected periods of Ame
history. (Fall)

197 **Contemporary Ideologies and Utopias** (3) Lev
A philosophic analysis of recent ideologies and utopias in Eur
the United States, and Asia: the sociological, psychological, polit
and intellectual origins of ideologies; their theoretical structure a
their practical functions; the relation of ideologies to social chan
the significance of the diffusion of ideologies to other cultu
ideologies and the problem of value-relativity. (Fall)

198 **Philosophy of the Social Sciences** (3) Lev
Philosophic issues relating to theory, methodology, and applicat
of the social sciences. Analysis of one major contemporary social
scientific project. (Spring)

Third Group

201–2 **Readings and Research** (3–3) Sta
Advanced readings and reports. Investigation of special proble
(Academic year)

216 **Seminar: Kant** (3) Schl
Critique of Pure Reason.

221 **Seminar: Logic of Choice** (3) Gri
Tools of formal logic applied to analysis and evaluation of a
ments justifying choices, both individual (optimality arguments)
collective (decision rules). (Spring)

231 **Ethics and Economic Policy: Justice and Equality** (3) Gri
Economic policy viewed from the perspectives of ethical and
nomic theories with special focus upon the issue of income distr
tion in the United States. (Fall)

251 **Seminar: Philosophy of Science** (3) Schlagel
Philosophical implications of quantum mechanics. (Fall)

252 **Seminar: Epistemology** (3) Schlagel
Cognitive development and human understanding. (Spring)

272 **Pragmatic Naturalism and American Social Policy** (3) Pfuntner
Examination of pragmatic naturalism as a criticism and reconstruction of American institutions. Evaluation of philosophical and theological alternatives to naturalism in the face of current technological and ecological problems. (Spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

PHYSICAL SCIENCE

See **Chemistry.**

PHYSICS

Professors H.H. Hobbs, J. Eisenstein, O. Bergmann, A.J. Zuchelli, F. Prats
Associate Professors W.C. Parke, N.K. Khatcheressian *(Chairman)*, D.R. Lehman, M.F. Taragin
Assistant Professors E.P. Harper *(Visiting)*, J.R. Peverley *(Visiting)*

Bachelor of Arts or Bachelor of Science with a major in physics (departmental)—The following requirements must be fulfilled:
1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—Phys 3, 14, 15, 16; Chem 11–12; Math 31, 32, 33.
3. Required course in related area—Stat 97 or EE 51.
4. Required courses in the major—Phys 151, 161, 162, 163, 164, 165–66, 167, 168.

Master of Arts in the field of physics—Prerequisite: a bachelor's degree with a major in physics at this University, or an equivalent degree.
Required: the general requirements, pages 90–98, and 30 semester hours of course work in physics, including Phys 231, 232, 233–34, 235, 236, 299–300, plus one of the following: Phys 241, 243, 244, 245, or 251 52.
A reading knowledge of a foreign language, or the successful completion of Stat 197, with a grade of *A* or *B*, is required.

Doctor of Philosophy in the field of physics—Required: the general requirements, pages 90–92, 98–100, and the successful completion of one of the two following tool requirement options: (a) two foreign language reading examinations or (b) one foreign language reading examination and completion of Stat 197 with a grade of *A* or *B*.
Research fields: experimental solid state physics (electrical conductivity of solids, defects in crystals, magnetic properties of solids at low temperatures, magnetic resonance, Mossbauer effect, superconductivity), and theoretical physics (elementary particles, field theory, general relativity, magnetic and optical properties of solids, molecular structure, nuclear and photonuclear reactions).

Bachelor of Arts in Education with a teaching field in physics—Prerequ
the education curriculum, pages 113–14.
Required: the physics option and the professional courses listed on page

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Departmental Prerequisite: Phys 3, 14, 15, 16; two semesters of calcul
equivalent; and consent of a departmental advisor are prerequisite
second-group courses.
Undergraduate departmental advisors: W. Parke, D. Lehman, N. Khatch
sian, M. Taragin
Graduate departmental advisors: H. H. Hobbs, J. Eisenstein, O. Berg
A. J. Zuchelli, F. Prats

ASTRONOMY

First Group

9–10 Introduction to Astronomy (3–3)
Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Cla
through modern astronomy with introduction to basic prin
underlying astronomical systems and observations. Primari
nonscience majors. Laboratory fee, $11 a semester. (Acad
year)

11–12 Introduction to Astronomy (2–2)
Same as Phys 9–10 without the laboratory. (Academic year)

21 Modern Cosmology (3)
Nonmathematical treatment of cosmology and related subjects
astronomy and physics. Quasars, peculiar galaxies, pulsars,
holes, antimatter, etc. Prerequisite: Phys 10 or 12.

PHYSICS

First Group

1 Foundations of Physics (4)
Lecture (2 hours), recitation (1 hour), laboratory (2 and one
hours). Development of conceptual principles underlying m
physical knowledge; basics of mechanics, heat and electromagn
including the classical concepts of energy, momentum, heat, tem
ture, entropy, electric and magnetic fields, optics. Prerequisite:
years of college preparatory mathematics or concurrent registr
in Math 6. Laboratory fee, $18.

2 Introduction to Modern Physics (4)
Lecture (2 hours), recitation (1 hour), laboratory (2 and one
hours. Topics focusing upon present understanding of the ph
universe and character of the atomic and subatomic worlds. Inc
considerations of length and time in relativity theory, present u
standing of gravitation, wave-particle duality, quantum theory, n
subnuclear particles. Prerequisite: Phys 1 or equivalent. Labo
fee, $18.

3 Foundations of Physics (3)
Same as Phys 1 without laboratory.

*4 **Introduction to Modern Physics** (3) Zuchelli

Same as Phys 2 without laboratory.

6 **Energy and the Environment** (3) Lehman

Consideration of energy resources and their utilizational impact on the environment from a physical viewpoint. Topics include: the demand for energy, the cost of energy, nuclear fission-radiation hazard to humans, pollution due to energy sources, transportation of energy and waste, and energy converters. Prerequisite: high school algebra.

14 **Introductory Mechanics and Thermal Physics** (3) Khatcheressian

Lecture (2 hours), recitation and laboratory (2 hours). Physical principles of mechanics and thermal physics utilizing tools of calculus. Topics emphasized are vector calculus, equilibrium phenomena, kinematics, Newton's Laws, conservation of mass, momentum and energy, rotational motion, small vibrations, thermometry, macroscopic and microscopic properties of ideal gases, the laws of thermodynamics, thermal properties of solids and liquids. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18.

15 **Elements of Electricity and Magnetism** (3) Taragin

Lecture (2 hours), recitation and laboratory (2 hours). Introductory aspects of electromagnetic theory. Topics include static electric fields, Coulomb's Law, Gauss' Law, electrical potential, capacitance and dielectrics, electric current and resistance, Ampere's Law, Faraday's Law, Maxwell's equations in integral form, electromagnetic waves. Prerequisite: Phys 3 or equivalent, Math 31. Laboratory fee, $18.

16 **Introduction to Modern Physics** (3) Lehman

Lecture (2 hours), recitation and laboratory (2 hours). Elementary approach to the basic principles of quantum theory. Topics include wave-particle duality, the hydrogen atom, Pauli's exclusion principle, x-ray spectra, the atomic nucleus, radioactivity, nuclear reactions, statistical distribution laws, applications to molecular and solid state physics. Prerequisite: Phys 14, 15; Math 32. Laboratory fee, $18.

27–28 **Physics in Medicine** (3–3) Parke

Principles of physics applied to biological systems and to medical instrumentation, including ultrasonics, circulation dynamics, bioenergetics, optics in medicine, applications of IR and UV radiation, medical transducers, particle radiation in medicine, models of the brain, molecular biophysics. Prerequisite: Phys 2 or equivalent.

Second Group

151 **Intermediate Research** (3) Taragin

Independent advanced work to introduce students to research techniques and use of specialized instruments. Laboratory fee, $11. (Academic year)

161 **Mechanics I** (3) Prats

Mechanics of mass points and rigid bodies. Newton's laws, con-

* This course may not be taken by students who have completed, or are enrolled in or plan to enroll in Phys 2.

servation laws, Euler's equations, inertia tensor, small vibrations, and elements of Lagrange's and Hamilton's equations.

162 Mechanics II (3) Prats

Basic aspect of continua, including elasticity and fluid dynamics, strain tensor, stress tensor, equations of equilibrium, elastic waves, ideal and viscous fluids.

163 Physical and Quantum Optics (3) Eisenstein, Hobbs

Oscillations and waves, energy and momentum of the electromagnetic field, interference, diffraction, geometrical optics, optics of crystals and other media, dispersion.

164 Thermodynamics (3) Taragin

Principles and applications of equilibrium thermodynamics, reversible processes, thermodynamic potentials, stability and phase changes.

165–66 Electromagnetic Theory (3–3) Lehman, Eisenstein

Development of Maxwell's field equations using vector and tensor calculus, electrostatics, stationary and nonstationary phenomena, basic circuit theory, electronmagnetic waves and radiation.

167 Principles of Quantum Physics (3) Khatcheressian

Development of logical structure and experimental bases for modern quantum mechanics. Simple examples worked out to clarify the structure; primary emphasis on conceptual framework and its mathematical realization; careful consideration of the laboratory results to which the theory is a response.

168 Applied Quantum Physics (3) Parke, Zuchelli

Explicit applications of principles of quantum mechanics to a variety of problems in atomic, molecular and nuclear physics. Quantum statistical mechanics developed with applications in solid state. Emphasis on explicit evaluation of solutions and the techniques required. Prerequisite: Phys 167 or equivalent.

170 Elementary Solid State Physics (3) Khatcheressian

Structure of solids, lattices and lattice defects, deformation, vibrational and electronic contribution to specific heats, binding energies, electronic states in metals and semiconductors, magnetic properties of solids. Elementary methods required such as quantum mechanics and normal mode expansions are developed as needed.

175 Nuclear Physics (3) Lehman, Prats

Introduction to application of quantum physics in the description of nuclei and their interactions. Properties of nuclei, nuclear models, nuclear forces, and nuclear reactions are considered. Specific topics include the deuteron, n-p scattering, the optical model, the shell model, the liquid-drop model, beta-decay, fission, and fusion. Prerequisite: Phys 167 or permission of instructor.

Third Group

Consent of a departmental graduate advisor is required for admission to third-group courses in Physics.

231 **Electromagnetic Theory: Macroscopic Effects** (3) Eisenstein

Detailed consideration of classical electromagnetic field theory in vacuum and in electrically and magnetically active media. Boundary-value problems, multipole expansions, induced polarizations, time-dependent fields, frame dependence of the fields, gauge transformations, radiation fields.

232 **Advanced Mechanics** (3) Zuchelli

Analytic methods of mechanics as a basis for modern theory: variational principles, Lagrange's equations, Hamiltonian formulation, canonical transformations, classical perturbation theory.

233–34 **Quantum Mechanics** (3–3) Prats

General aspects of quantum mechanics with emphasis upon the developmental principles involved. Operators, representations and transformation theory. Schrödinger and Heisenberg pictures, angular momentum, perturbation theory, scattering theory. (Academic year)

235 **Special Relativity** (3) Bergmann

Application of relativistic concepts to the basic fields of physics: space and time, tensors and covariant mechanics of point particles, covariant form of electromagnetism, relativistic variational principles, relativistic quantum equations.

236 **Electromagnetic Theory: Electrodynamics and Radiative Effects** (3) Bergmann, Eisenstein

Analysis of problems involved in obtaining the motion of charges in given electromagnetic fields and radiation from such charges. Covariant methods developed and used where suitable. Specific topics include radiation by moving charges, spectral decomposition and integrated flux, angular distribution of radiation, radiation reaction and anomalies.

241 **Statistical Mechanics** (3) Lehman, Bergmann

Study of classical and quantum equilibrium statistical mechanics. Kinetic theory and transport phenomena reviewed prior to examining principles of statistical mechanics. Among topics considered: distribution functions, H-theorems, partition functions, Gibb's paradox, canonical ensemble, grand canonical ensemble, ideal gases, interacting gases, cluster expansion, virial expansion, and density matrices.

242 **Atomic and Molecular Structure** (3) Bergmann

Structure of atoms and molecules, energy levels, binding energy, optical activity. Hartree and Hartree-Fock equations, spin-effects, rotational and vibrational effects, para-magnetic resonance, chemical binding.

243 **Solid State Physics: Structure and Binding** (3) Khatcheressian, Hobbs, Taragin

Atomic structure of solids and analysis of the binding of crystals. Crystalline forms and symmetries, atomic vibrations and specific heats, sound and optical propagation, crystalline defects.

244 **Solid State Physics: Electronic Processes in Metals** (3) Khatcheressian, Eisenstein

Phenomena in metals and semi-conductors determined by the electronic states allowed: binding, specific heats, magnetic properties, transport phenomena. Independent particle approximation and many-body aspects are discussed.

245 **Quantum Electrodynamics: Theory and Applications** (3) Zuchelli

A presentation of the lower order effects depending upon the quantal nature of the electromagnetic field: Hamiltonian formulation and field quantization, perturbation calculations, Compton effect, photoelectric effect, electron-electron scattering, pair creation and annihilation, indices of refraction, divergence difficulties.

246 **Quantum Field Theory** (3) Bergmann

Covariant presentation of general theory of quantized fields, Boson and Fermion fields, theory of S-matrix, dispersion relations, and renormalization program.

247 **Nuclear Theory** (3) Prats, Lehman

Nuclear interactions, nuclear models, theory of nuclear reactions, pion physics and weak interactions.

248 **Elementary Particles** (3) Parke

Experimental properties and present theoretical understanding of sub-nuclear particles; applied S-matrix formalism; symmetry principles; unified models, and theories of weak, electromagnetic, and strong interactions.

249 **Statistical Processes** (3) Zuchelli

Analysis of problems involved in understanding and predicting the approach to equilibrium of a complex system within the classical context, as exemplified by rare or dense gases, ionized gases, or plasmas. Specific topics include Liouville equation, ergodic theory, Boltzmann equation, Boltzmann-Vlasov equation, Chapman-Enskog theory, Bogoliubov time scales, Prigogine type formalism, convergence questions.

250 **Selected Topics in Modern Physics** (3) Staff

Possible topics include nuclear three-body problem; group theory and symmetry principles in physics; differential manifolds applied to physics; electric states and superconductivity; gauge field theories; dispersion relations and unitarity in scattering theory. May be repeated for credit with permission of graduate advisor. (Fall and spring)

251–52 **Laboratory** (3–3) Staff

Individual work on special topics. Laboratory fee, $15 a semester. (Academic year)

254 **General Theory of Relativity** (3) Bergmann

Physical principles and mathematical methods underlying Einstein's field equation, geodesic equations of motion, checks of the theory, action principle, conservation laws, perturbation theory, gravitational radiation theory, relativistic cosmology. Offered on demand.

291 **Seminar** (1) **Staff**
Lectures on special problems in physics. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**
(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated once for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

PHYSIOLOGY—GRADUATE PROGRAMS

Professors C.S. Tidball, R.A. Kenney *(Chairman)*, M.E. Tidball, M.M. Cassidy, M.J. Jackson
Associate Professors R.A. Lavine, D.W. Watkins
Assistant Professor M. Frank

Master of Science in the field of Physiology—Prerequisite: a bachelor's degree. No major is specified, but the undergraduate program must have included the following courses or their equivalents: BiSc 11-12; Chem 11-12, 22, 151-52, 153-54; Math 31; Phys 1, 2.

Required: the general requirements, pages 90–99. In addition to the thesis, the 30 hours of required work should include Phyl 201, 221, 298, and at least three semester hours of research (Phyl 295).

Doctor of Philosophy in the field of Physiology—Required: the general requirements, pages 90–92, 98–100. The program of study includes a major field in physiology, a subfield (see below) in physiology, and a minor field outside of physiology leading to the Cumulative Examination. The 48 semester hours of required course work leading to the Cumulative Examination should include Bioc 221-22; Phyl 201, 221, 298, 396, 397; and a minimum of eight semester hours each in two areas outside of Physiology in addition to the minor field.

Research fields and areas of study: applied physiology, cardiovascular physiology, cellular physiology, endocrine physiology, gastrointestinal physiology, neurophysiology, renal physiology, and respiratory physiology.

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in physiology numbered above 201.

Second Group

191 **Selected Topics in Human Structure and Function** (3) Kenney
Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. Though an undergraduate course, this is required for graduate students who have not had Anat 201 or equivalent; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent

and consent of instructor. Open to Columbian College of Arts and Sciences students with the approval of the student's major advisor. (Fall)

Third Group

201 **Physiology** (8) Staff

Lecture (6 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied mammalian physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221-22 (Bioc 222 may be taken concurrently); or consent of chairman of department. Open to Consortium students only with permission of department chairman. (Spring)

205 **Cell Biophysics** (2) Jackson

Lecture (2 hours). An introductory survey of the mechanisms for interconversion and utilization of energy in animal cells. A required course for graduate students intending to take Phyl 201. Prerequisite: BiSc 11–12 or equivalent, and consent of instructor. Open to students in the Columbian College of Arts and Sciences with the approval of the student's major advisor. (Fall)

212 **Neurobiology** (3) Staff

Same as Anat 212. An integrated survey of the structure and function of the human nervous system; lecture, clinical demonstrations, and laboratory. Laboratory fee, $25.

221 **Seminar** (1) Cassidy

Staff and student presentations from literature. Present work discussed, experimental design and scientific deduction evaluated. Topics to be announced. Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

*223–24 **Biomedical Instrumentation** (4–4) Staff

Same as Bioc 225 26 and Micr 240–41. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification, and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee, $50. (Academic year)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2) Cassidy

Discussion on principles of fluid and acid-base balance and the application of these principles to scientific situations. (Fall)

260 **Membrane Physiology** (1) Jackson

Weekly lectures or seminar. Systematic review of the factors which determine the movements of water and solutes across simple cellular membranes and complex epithelial barriers in animal tissues. Prerequisite: Phyl 205 or permission of instructor. (Fall)

261 **Gastrointestinal Physiology** (1 or 2) Jackson, Dobbins†

Weekly seminar; role of basic sciences in gastroenterology; intra- and extra-mural speakers. An approved paper required for two

* An interdisciplinary course offered by the Biochemistry, Microbiology and Physiology Departments.

† Dr. W. O. Dobbins III is Professor of Medicine, School of Medicine and Health Sciences.

semester hours of credit. May be repeated for credit. (Fall and spring)

262 **Topics in Cardiovascular Physiology** (2) **Kenney**
Survey, at an advanced level, of aspects of cardiovascular physiology especially as interrelated with the respiratory and renal systems. (Fall)

*268 **Muscle Contraction: Physiological and Biochemical Aspects** (2) **Walker, Frank**
Anatomical, biochemical, pharmacological, and physiological aspects of muscle contraction. Prerequisite: an introductory course in biochemistry and physiology, or permission of the department.

269 **Topics in Neurophysiology and Psychophysiology** (2) **Lavine**
Selected topics in contemporary neurophysiology, including methods of data collection and analysis, control mechanisms involved in movement and behavior and sensory processing. Open to students in the School of Engineering and Applied Science with permission of instructor. (Fall)

270 **Computer Utilization in Physiology and Medicine** (3) C. Tidball
Lecture one hour a week, practical experience at student's convenience. Orientation to processing analog and digital signals on mini-computers. Programming in assembly language as well as a high-level language of the student's choice. No previous computer experience necessary. (Fall)

271 **Computer Simulation of Physiological Processes** (3) C. Tidball
Lecture 1 hour a week; practical experience at student's convenience. Programming of physiological simulation will be learned by writing a series of simulations of increasing complexity. Prerequisite: Phyl 270 or equivalent or permission of instructor.

272 **Reading and Research in Simulation of Physiological Processes** (3) **C. Tidball**
Readings in physiological simulations and their evaluation. Informal discussions at regular intervals. Prerequisite: Phyl 271 or equivalent or permission of instructor. May be repeated once for credit.

295 **Research** (arr.) **Staff**
By special arrangement with individual staff members. Approximately four clock hours in the laboratory for each semester hour of credit. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) **Staff**
Guided review of selected areas of physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) **Staff**
(Fall and spring)

* An interdisciplinary course offered by the Biochemistry and Physiology Departments.

Fourth Group

396 **Advanced Reading and Research** (2) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of Physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in Physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problems. This course satisfies the requirement for Part III of the Cumulative General Examination in Physiology. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

POLISH

See **Slavic Languages and Literatures.**

POLITICAL SCIENCE

Professors R.E. Purcell, H.L. LeBlanc, B. Nimer, A. Gyorgy, H.C. Hinton, B.M. Sapin, J.A. Morgan, Jr., B. Reich *(Chairman)*, Y.C. Kim
Adjunct Professor D. Robinson
Associate Professors C.F. Elliott, C.A. Linden, S.J. Wayne, J.M. Logsdon, H.R. Nau, R.L. Cole
Assistant Professors D. Fischer, G.C. Mackenzie, S. Shaffer, C. McClintock, M.J. Sodaro *(Visiting)*, S.L. Wolchik *(Visiting)*, W.C. Adams *(Visiting)*, J.R. Henig
Instructor E.A. Peterson

Bachelor of Arts with a major in political science (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.

2. Prerequisite: PSc 1 and 2. Six courses in the social sciences, other than political science, to include six hours of history or six hours of economics. Twelve semester hours of introductory foreign language courses are recommended for students interested in political theory, comparative government, or international relations. Courses in statistics are strongly recommended for students interested in American government or public policy and for those anticipating graduate study in political science.

3. Required courses in the major: 30 semester hours of second-group political science courses, including a distribution requirement which consists of three semester hours from each of the following groups: Group A (political theory and methodology)—PSc 101, 102, 105, 106, 107, 108, 109, 110. Group B (American government and politics)—PSc 111, 113, 114, 115, 116, 118, 119, 120, 121. Group C (comparative government and politics)—PSc 130, 131, 146, 165, 168, 170, 173, 177, 179, 180, 181, 183. Group D (international politics, law, and organi-

zations)—PSc 140, 142, 144, 149, 178, 182, 184. Group E (public policy)—PSc 104, 112, 117, 122, 124.

Up to 12 hours of either service-learning courses or internships with their associated seminars may be credited toward a degree. No more than six hours of such courses may be credited toward the major, and they do not satisfy the distribution requirement.

Students in the 90-semester-hour degree program (see pages 82–83) must receive grades of *A* in at least 18 semester hours of second-group political science courses.

Students may apply for graduation with Special Honors. To qualify, a student must fulfill the general requirements (see page 51) and take at least one political science honors seminar in which an independent study project is completed with distinction. A departmental committee will review the project and make a recommendation for graduation with Special Honors.

Master of Arts in the field of political science—Prerequisite: a bachelor's degree with a major in political science from an accredited college or university, or an equivalent degree, and high undergraduate scholastic standing.

Required: The general requirements, pages 90–98, and a reading knowledge of a modern foreign language or a specified level of knowledge in statistics. The choice of a foreign language, or of statistics in lieu of a language, must be made with the approval of the department. Students may elect one of the following programs: (1) 24 semester hours of graduate course work, plus a thesis (equivalent to six semester hours), and the satisfactory completion of a Master's Comprehensive Examination in three subfields selected from those listed under the Ph.D. program; or (2) 33 semester hours of graduate course work without a thesis and the satisfactory completion of a Master's Comprehensive Examination in four subfields selected from those listed under the Ph.D. program.

PSc 200 is required of all students during the first semester of graduate study unless they demonstrate knowledge of the course's subject matter by passing a waiver examination.

Doctor of Philosophy in the field of political science—Students of outstanding ability are admitted to the doctoral program upon recommendation of a departmental graduate committee and the concurrence of the dean of the Graduate School of Arts and Sciences.

Required: The general requirements, pages 90–92, 98–100. Each student must complete a General Examination, which covers a major and minor field of study.

PSc 200 and 201 are required of all students unless they demonstrate knowledge of the courses' subject matter by passing a waiver examination.

Each student must choose a major and minor field of study from four principal subject-matter divisions. Each subject-matter division has several subfields of study from which the student, in consultation with an advisor, constructs a program. A major field of study consists of three subfields; a minor field of study consists of two subfields.

The subject-matter divisions and their subfields are (1) theory and methodology (analysis of Western political thought, analysis of Marxist and Marxist-Leninist thought, and scope and methods of political science); (2) comparative and foreign politics (comparative political analysis, regional comparative politics, and domestic politics of a specified major political system); (3) international relations (international politics, international law, regional international relations, and foreign relations of a specified major political system); and (4) American politics (American political process, national policy-making process, American constitutional law and judicial process, and state, local, and urban politics). Quantitative political analysis may be used as a subfield in any of the subject-matter divisions.

Departmental prerequisite: PSc 1 and 2 (or their equivalent) are prerequisite to all second-group courses in political science.

First Group

1 **Introduction to Comparative and International Politics** (3) — Gyorgy, Nau, McClintock

Comparative and international political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies. (Fall and spring)

2 **Introduction to American Politics and Government** (3) — Purcell, LeBlanc, Wayne, Cole

Structure, powers, and processes of the American political system. (Fall and spring)

3 **Introduction to Political Behavior** (3)

Study of political behavior, including the role of politics in today's world, the sources of elite and mass political behavior, and the influence and nature of political institutions. May be taken only with joint registration in Hum 3. (Fall)

*91 **East Asia—Past and Present** (3) — Johnson and Associated Faculty

An interdisciplinary course, introducing the student to a comprehensive and integrated understanding of the civilization and present problems of East Asia.

Second Group

101 **Scope and Methods of Political Science** (3) — Kim, Cole, Shaffer

Nature of political inquiry, approaches to the study of politics and government, empirical methods of research. (Fall and spring)

102 **Empirical Political Analysis** (3) — Cole, Shaffer

Extensive examination of empirical research methods in the analysis of political behavior. Research design, data collection (survey and aggregate), and data analysis. Prerequisite: PSc 101 or permission of instructor. (Spring)

104 **Methods of Public Policy Analysis** (3) — Henig

Models and case studies of public policy formation and changes; techniques of policy analysis and evaluation, normative implications of alternative policy-making frameworks. (Spring)

105 **Political Theory: Major Issues of Western Political Thought I** (3) — Linden, Fischer

Foundations of Western political thought—Plato to Aquinas. (Fall and spring)

106 **Political Theory: Major Issues of Western Political Thought II** (3) — Linden, Fischer

Theoretical roots of modern political order and disorder—Machiavelli to Rousseau. (Fall and spring)

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* An interdepartmental course offered by the Political Science, East Asian Languages and Literatures, Economics, Geography and Regional Science, History, Philosophy, and Religion Departments.

107 **Issues in Modern Political Thought** (3) Linden, Wolchik

Issues of modern political thought as seen through major representative thinkers. Emphasis on conservative, liberal, and radical thought. (Fall)

108 **Modern Communist Ideologies** (3) Elliott

Intensive study of theories and philosophical assumptions of modern communism. Emphasis on the careers and ideas of leading figures: Marx, Engels, Lenin, Stalin, Khrushchev, and Mao. (Fall)

109 **Democratic Theory** (3) Staff

Issues of recent democratic thought and theory, particularly in relation to the contemporary American political process. (Fall)

110 **American Political Thought** (3) Morgan

Political thought in the U. S. from colonial times to the present as seen through major representative writings. (Spring)

111 **State and Urban Politics** (3) Cole, Henig

Comparative analysis of context, institutions, processes, and policies of state and urban political systems. (Fall)

112 **State and Urban Policy Problems** (3) Cole, Henig

Selected issues in state and urban policy-making, with emphasis on urban and metropolitan settings. (Spring)

113 **Policy and Politics of Intergovernmental Relations** (3) Cole

Analysis of relationships among national, state, and local governments. Emphasis on the policy consequences of intergovernmental relations and the emerging federal system. (Fall)

114 **U.S. Constitutional Law and Politics I** (3) Morgan

Separation of powers, federal-state relationships, economic regulation. (Fall)

115 **U.S. Constitutional Law and Politics II** (3) Morgan

Political and civil rights. (Spring)

116 **The American Presidency** (3) Wayne

Examination of the politics of presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influences of personality on performance. (Fall and spring)

117 **Public Administration and Bureaucratic Politics** (3) Teich

Basic concepts in public administration; influence of bureaucratic politics on policy formulation and implementation. (Spring)

118 **Legislative Process** (3) Mackenzie

Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches. (Fall and spring)

119 **U. S. Political Parties and Politics** (3) LeBlanc

Role of parties as a linkage between mass preferences and government policies. Organization, nominations, voting, and activities in legislative and executive branches. (Fall and spring)

120 **Public Opinion and Political Socialization** (3) Staff
Sources of mass political attitudes and behavior; voting and political campaigning. (Spring)

121 **Politics and Social Change in America** (3) Staff
Patterns of power and influence in American society; ideology and change; limits of institutional reform; interest groups and social movements; role of protest and violence. (Fall)

122 **Science, Technology and Politics** (3) Logsdon, Teich
Multiple impacts of scientific and technological developments on the political systems. Discussion of public policies for support, use and control of science and technology. (Fall and spring)

124 **Issues in Domestic Public Policy** (3) Cole, Henig
Current status of governmental programs dealing with various social problems in such areas as health, crime, poverty, education and transportation. (Fall or spring)

130 **Comparative Government and Politics I** (3) Kim, McClintock, Peterson
Comparative political analysis with primary focus on the principal states of Western Europe. (Fall and spring)

131 **Comparative Government and Politics II** (3) Gyorgy, Hinton, Elliott, Sodaro
Government and politics of the communist nations; emphasis on the Soviet Union and countries of Eastern Europe. (Fall and spring)

140 **International Politics** (3) Nau, Shaffer
International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy. (Fall and spring)

142 **International Organizations** (3) Nau, Stambuk
Development and operations of the United Nations, regional organizations, and functional international organizations. (Fall and spring)

144 **Public International Law** (3) Fischer
(Formerly Public International Law and Organization)
Survey of international law; emphasis on development and trends. (Fall and spring)

146 **U. S. Foreign Policy** (3) Purcell
Constitutional, political, and international factors that determine the formulation, execution, and substance of U.S. foreign policy. (Fall and spring)

149 **Military Force and Foreign Policy** (3) Sapin
Impact of military considerations on U.S. foreign policy; major problems in national security, e.g., strategic weaponry, military assistance, regional security problems. (Spring)

165 **Government and Politics in Eastern Europe** (3) Gyorgy
Study of the contemporary social and ethnic structures, govern-

mental systems, and international position of the Eastern European states within the Soviet system. (Summer)

168 **Soviet Foreign Policy** (3) Elliott

Relations with U. S., Europe, Third World, China; international communism; instruments of foreign policy; interrelationships between domestic and foreign policies; ideology and foreign policy. (Fall)

170 **Governments and Politics of China and Japan** (3) Hinton

Political institutions and processes of China since 1949 and of Japan since 1945. Influence of indigenous traditions and foreign contacts. (Fall)

173 **Governments and Politics of South and Southeast Asia** (3) Hinton

Domestic and international politics of the area's major states. (Spring)

177 **Governments and Politics of the Middle East** (3) Reich

Politics of the eastern Arab states, Turkey, Iran, Israel. (Fall)

178 **International Relations of the Middle East** (3) Reich

Analysis of the regional and international relations of the Middle East. (Spring)

179 **Israeli Foreign Policy** (3) Reich

Examination of the institutions, processes, and issues of Israeli foreign policy. (Fall)

180 **Governments and Politics of North Africa** (3) Reich

Domestic and international politics of Algeria, Tunisia, Morocco, Libya, Egypt, Sudan; their relations with states of the Middle East. (Spring)

181 **Politics of Middle and Southern Africa** (3) Nimer

Comparative analysis of political systems in selected countries of non-Mediterranean Africa. (Fall)

182 **African International Politics** (3) Nimer

Analysis of interstate relations in Africa and of selected aspects of African relations with the outside world. Recommended prerequisite: PSc 181 or equivalent. (Spring)

183 **Governments and Politics of Latin America** (3) McClintock

Political processes and institutions in Latin America; emphasis on Argentina, Brazil, Chile, and Mexico. (Fall)

184 **International Relations of Latin America** (3) McClintock

U. S.-Latin American relations, inter-American diplomacy and organization, foreign policies of selected states, the Cuban revolution. (Spring)

*188 **Internship: Congressional Politics** (3 or 6) Robinson

Study of the legislative process through readings on the structure and process of the U.S. Congress and work in a congressional office

* Admission requires departmental approval.

or committee. Students who have taken PSc 118 may register for only 3 credit hours. (Fall and spring)

*187 **Internship: Political Behavior** (3 or 6) Mackenzie
Internship with a variety of interest groups and, during election years, political campaigns. Analysis of the structural and behavioral limitations which confront those who wish to exercise political influence. (Fall and spring)

*188 **Internship: Urban Affairs** (3 or 6) Henig
Study of urban political and policy-making processes through assignment to an urban-related political or governmental office. Primarily for senior urban affairs majors. (Fall and spring)

*189 **Internship: Legal Process** (3 or 6) Wallace
The legal system and its role in promoting social change. Readings, group discussions, and work with lawyers and third-year law students. (Fall and spring)

*191 **Proseminar: International Affairs** (3 or 6) Sapin, Reich
Examination of selected problems in international relations. (Fall and spring)

*192 **Proseminar: Political Science** (3) Staff
Examination of selected problems in political science. (Fall and spring)

*193 **Proseminar: Urban Affairs** (3 or 6) Henig
Readings, research, and class discussion on selected topics in urban politics and policy-making. Primarily for senior urban affairs majors (Fall and spring)

*196 **Honors Seminar: Political Theory** (3) Staff
Research on selected topics. Prerequisite: PSc 101. (Fall or spring)

*197 **Honors Seminar: American Government and Politics** (3) Staff
Research on selected topics. Prerequisite: PSc 101. (Fall or spring)

*198 **Honors Seminar: Comparative Government and Politics** (3) Staff
Research on selected topics. Prerequisite: PSc 101. (Fall or spring)

*199 **Honors Seminar: International Politics** (3) Staff
Research on selected topics. Prerequisite: PSc 101. (Fall or spring)

Third Group

200 **Scope and Methods of Political Science** (3) Linden, Wayne, Shaffer
Introduction to the discipline and profession, analysis and comparison of some approaches to political inquiry, and empirical research design. (Fall and spring)

201 **Empirical Political Analysis** (3) Cole
Techniques of social science data analysis. Emphasis on using computers for statistical analysis in political research. No previous experience with statistics or computers required. (Fall)

* Admission requires departmental approval.

202 **Advanced Topics in Empirical Political Analysis** (3) — Cole, Shaffer

Advanced techniques of data collection and analysis: varying emphasis on such methods as casual modeling, analysis of variance, regression analysis, and simulation. (Spring)

203 **Public Policy Analysis** (3) — Teich, Henig

Reading and research on systematic methods of public policy analysis. (Spring)

205 **Readings in Political Theory** (3) — Linden

Selected major works, both ancient and modern, which illuminate basic problems and questions of political theory. (Fall)

206 **Topics in Political Theory** (3) — Linden, Fischer

(Formerly Normative Political Theory)

Advanced readings and group discussions. Analysis and interpretation of selected concepts and schools of thought. (Spring)

207 **Readings in Socialism and Communism** (3) — Elliott, Linden, Wolchik

Readings and discussions of works illuminating the development of pre- and post-Marxian socialist thought. (Fall)

208 **Readings in Marxism-Leninism** (3) — Elliott, Linden

Readings and discussions in Marxism-Leninism and its controversies from Lenin to the present. (Spring)

209 **Democratic Theory** (3) — Staff

Readings and discussions in democratic theory. Attention to recent work toward formulation of adequate theory in American political science. (Fall or spring)

210 **American Political Thought** (3) — Staff

Readings and discussions. Analysis and evaluation of major intellectual sources of American political thought.

211 **State Politics** (3) — Cole, Henig

Comparative analysis of American state politics, including state political institutions and policy-making processes, state policy choices, and the state role in the federal system. (Fall)

212 **Urban Politics** (3) — Cole, Henig

The socioeconomic, demographic, and cultural context of urban politics; informal patterns of power and influence in urban decision-making; formal institutions and policy-making processes; urban policies and their impacts. (Spring)

213 **Intergovernmental Relations** (3) — Cole

Analysis of the fiscal, structural, social, and political aspects of the evolving federal system; emphasis on metropolitan government. (Fall)

214 **Topics in Constitutional Law** (3) — Morgan

Lectures and group discussions on constitutional law and politics. (Fall, even years)

215 **Judicial Policy-making** (3) Morgan
Role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues. (Fall, odd years)

216 **American Presidency** (3) Wayne
Personalized and institutionalized aspects of the presidency with particular emphasis on the politics of legislative policy-making. (Fall)

217 **Bureaucratic Politics** (3) Mackenzie, Teich
Structure and operation of governmental bureaucracy with particular emphasis on the politics of formulating and implementing public policy. (Spring)

218 **Legislative Theory and Behavior** (3) Mackenzie
Organization, behavior, and policy outputs of the U.S. Congress. (Spring)

219 **American Political Parties and Electoral Behavior** (3) LeBlanc
(Formerly American Political Parties and Interest Groups)
Nature and functions of political parties, with special emphasis on party influences on electoral behavior and congressional decision-making. (Fall)

220 **Public Opinion and Political Socialization** (3) Staff
(Formerly Public Opinion and Voting Behavior)
Sources and dynamics of public opinion and political socialization (Spring)

222 **Government, Science, and Technology** (3) Logsdon, Teich
National and international policy issues which arise from the interaction between scientific and technological development and governmental activity. (Fall)

223 **Science, Technology, and Public Affairs** (3) Logsdon, Teich
Selected public policy issues with significant scientific or technological aspects. (Spring)

230 **Comparative Government and Politics I** (3) Kim, McClintock (Fall)
Examination of basic approaches to comparative politics.

231 **Comparative Government and Politics II** (3) Kim, McClintock
Comprehensive examination of specific issue areas in comparative political analysis. (Spring)

*232 **Comparative Communist Systems I** (3) Wolchik
Ideological foundations of communism; emergence of the Soviet system; development of the international communist movement to World War II; postwar formation of the Soviet bloc. (Fall)

*233 **Comparative Communist Systems II** (3) Wolchik
Comparative analysis of recent ideological trends, political institutions, and behavior among ruling and nonruling Communist Parties (Spring)

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* An interdepartmental course offered by the History and Political Science Departments.

240 **Theories of International Politics I** (3) Nimer, Shaffer
Critical examination of contemporary theories, both empirical and normative, with emphasis on actor theory. (Fall)

241 **Theories of International Politics II** (3) Nimer, Shaffer
Critical examination of contemporary theories, both empirical and normative, with emphasis on interaction theory. (Spring)

242 **Problems in International Organizations I** (3) Nau, Stambuk
Social and economic interdependence and the politics of international organizations.

243 **Problems in International Organizations II** (3) Nau, Stambuk
Collective security, law, and the politics of international organizations.

244 **International Law I** (3) Fischer
Readings in selected areas. (Fall)

245 **International Law II** (3) Fischer
Research in selected areas. (Spring)

246 **U. S. Foreign Policy** (3) Purcell
Research and selected reading as the basis for analysis of U.S. foreign policy. Particular reference to the decision-making process and policy execution. (Fall)

247 **Public Opinion and Foreign Policy** (3) Purcell
Research and readings on U.S. public opinion interest groups that influence foreign policy. (Spring)

248 **U. S. National Security Policy-making** (3) Sapin
Executive organization and processes for national security policy-making. Attention to relevant theoretical approaches. (Fall)

249 **U. S. National Security Policy** (3) Sapin
Fundamental considerations; selected issues, e.g., arms control and disarmament, regional security problems, military assistance. (Spring)

251 **Principles and Problems of International Political Communication** (3) Staff
Reading and discussion of public opinion/foreign policy relationships and operation of international political communication programs by major world powers as a tool of foreign policy. (Spring)

252 **Science, Technology, and World Order** (3) Nau
Intensive reading, discussion, and research on the impact of science and technology on world order, in particular on the claim that a new global politics is replacing traditional or nation-state politics. (Spring)

260 **Western European Politics** (3) Peterson
Comparative examination of major characteristics of the political systems in France, England, and the two Germanies. Special attention to political culture, socialization, recruitment, and communication. (Fall and spring)

261 **Problems in Transnational and Comparative Politics of Western Europe** (3) Stambuk, Peterson

National and supranational political processes in Western Europe; emphasis on comparative analysis of interest aggregation and articulation, interbureaucratic relations, and selected policy outcomes.

263 **Communism in Non-Communist Europe** (3) Sodaro

Examination of non-ruling European communist parties; relations between these parties and other ruling and non-ruling communist parties.

264 **Political and Social Institutions of Eastern Europe** (3) Gyorgy

Major political and social factors which have shaped the inter-war, World War II, and post-war evolution of Eastern Europe; emphasis on selected countries. (Fall)

265 **Governments and Politics of Eastern Europe** (3) Gyorgy

Comparative study of Eastern European states: political, social, economic institutions; problems of regional integration and relations with outside powers. (Spring)

266 **Readings in Soviet Government and Politics** (3) Elliott, Linden

Readings in contemporary Soviet domestic government and politics (Fall)

267 **Soviet Government and Politics** (3) Elliott, Linden, Wolchik

Research seminar in selected problems of Soviet domestic government and politics. Emphasis: since Stalin. Prerequisite: PSc 266 or permission of instructor. (Spring)

268 **Soviet Foreign Policy** (3) Elliott

External problems and policies of the USSR, with emphasis on the period since 1960. Relations with other communist states, Western powers, other countries, and non-ruling communist parties. (Spring)

269 **Soviet Military Policy and Strategy** (3) Wolfe, Elliott

Soviet developments in military policy and strategy with attention to intra-bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought. (Fall or spring)

270 **Politics of Mainland China I** (3) Hinton

Introduction to the literature and to graduate research in contemporary Chinese politics. Readings and group discussion. (Fall)

271 **Politics of Mainland China II** (3) Hinton

Introduction to the literature and to graduate research in contemporary Chinese politics. Research seminar. (Spring)

272 **Foreign Policy of Mainland China** (3) Hinton

Objectives; formulation and implementation; Communist China as Asian state, revolutionary influence, would-be great power. (Spring)

273 **Governments and Politics of South and Southeast Asia** (3) Purcell

Research and selected readings as basis for analysis of structure,

problems, and policies of the governments of selected countries; particular reference to India. (Spring)

274 **Southeast Asia in World Politics** (3) Staff
Southeast Asia in great-power perspective. Balance-of-power concept and development of Asian subsystem. (Spring)

275 **International Politics of the Far East** (3) Hinton
Foreign policies and international behavior of regional states and extraregional powers, principally the U.S. and the Soviet Union. (Fall)

276 **Governments and Politics of Japan and Korea** (3) Kim
Readings and research on the domestic and foreign policies of Japan, North and South Korea. (Fall or spring)

277 **Governments and Politics of the Middle East** (3) Reich
Readings and research on selected problems of the governments and politics of the Middle East. (Fall)

278 **International Relations of the Middle East** (3) Reich
Readings and research on the regional and international relations of the Middle East. (Spring)

280 **Governments and Politics of North Africa** (3) Reich
Readings and research on selected problems in the governments, politics, and international relations of North Africa. (Spring)

281 **Topics in African Politics** (3) Nimer
Readings, research, and discussion of selected aspects of African domestic and international politics. (Spring)

283 **Latin American Politics I** (3) McClintock
Readings and discussions on Latin American political processes and institutions. (Fall)

284 **Latin American Politics II** (3) McClintock
Individual research and class discussion on selected topics. (Spring)

285 **Problems in Latin American Civilization** (3) Staff
Interdisciplinary seminar partially guided by a specialist in the methodology of his/her chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

286 **Selected Topics in American Politics** (3) Staff
Readings and discussion. (Fall or spring)

287 **Selected Topics in Political Theory** (3) Staff
Readings and discussion. (Fall or spring)

288 **Selected Topics in Comparative Politics** (3) Staff
Readings and discussion. (Fall or spring)

289 **Selected Topics in International Politics** (3) Staff
Readings and discussion. (Fall or spring)

290 **Colloquium: Middle East** (3) Reich
Interuniversity colloquium for advanced students of Middle East affairs. Admission by permission of the instructor.

291 **Colloquium: East Asia** (3) Hinton
Interuniversity colloquium for advanced students of Far Eastern affairs. Admission by permission of the instructor.

292 **Colloquium: Russia and Eastern Europe** (3) Gyorgy
Interuniversity colloquium for advanced students of Russian and Eastern European affairs. Admission by permission of the instructor.

297 **Reading** (3) Staff
Limited to master's degree candidates. Written permission of instructor required. (Fall and spring)

298 **Research** (3) Staff
Limited to master's degree candidates. Written permission of instructor required. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff

Fourth Group

301 **Advanced Reading and Research in Political Theory** (3) Staff
(Fall or spring)

310 **Advanced Reading and Research in American Politics** (3) Staff
(Fall or spring)

340 **Advanced Reading and Research in Comparative Politics** (3) Staff
(Fall or spring)

350 **Advanced Reading and Research in International Politics** (3) Staff
(Fall or spring)

397 **Advanced Reading** (3) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

398 **Advanced Research** (3) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (3) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

PORTUGUESE

See **Romance Languages and Literatures.**

PSYCHOLOGY

Professors T. Hunt *(Emeritus)*, E.L. Phillips, J.N. Mosél *(Chairman)*, B.I. Levy, W.E. Caldwell, R.D. Walk, R.K. White *(Emeritus)*, A.D. Kirsch, E. Johnson *(Emeritus)*, V. Kirkbride *(Emeritus)*, C.E. Rice, E. Abravanel, D.E. Silber, J. Miller, C.J. Lange
Adjunct Professors R.F. Caron, J.B. Margolin
Professorial Lecturers R.K. Kahn, W.A. McClelland, M. Shore
Associate Professors C.E. Tuthill, R.H. Tanck *(Research)*, S.A. Karp, R.W. Holmstrom, L.A. Rothblat
Adjunct Associate Professors D.G. Kleiman, F. Schmidt
Associate Professorial Lecturer S.L. Cohen
Assistant Professors P.J. Poppen, L. Brandt, S.K. Green, A.R. Bruhn, S. Hashtroudi
Assistant Professorial Lecturer S.A. Sibley

Clinical Training Staff

Professor J. Borriello
Associate Clinical Professors I.M. Zimmerman, J.W. Cummings, M.E. Zedek, E. Blum, P.D. Daen

Bachelor of Arts with a major in psychology (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87.
2. Prerequisite courses—seven or eight semester hours selected from Psyc 1, 5 and 6.
3. Required courses in related areas:

(a) three semester hours selected from Stat 51, 53, or any first-group course in mathematics except Math 6. (Students expecting to do graduate study in psychology should elect Stat 53.)

(b) 12 semester hours selected from American civilization, anthropology, economics, geography and regional science, history, philosophy (Phil 71, 113, 151 recommended), political science or sociology, of which six hours must be from one of the following: anthropology, economics, history, political science or sociology. If a student takes more than six hours in any one department, the excess will be credited to electives.

4. Required courses in the major—24 semester hours in second-group psychology courses, including Psyc 196 and one course from each of the following groups—*Group A*: Psyc 118, 121, 161; *Group B*: Psyc 115, 144, 151, 156; *Group C*: Psyc 101, 112, 129, 131.

It is recommended that students contact their academic advisers as soon as possible for assistance in planning their programs of study.

Although there is no foreign language requirement, students contemplating graduate study are reminded that most graduate schools require knowledge of one and sometimes two foreign languages.

Master of Arts in the field of psychology—Prerequisite: the degree of Bachelor of Arts with a major in psychology at this University, or an equivalent degree. Admission to the program is limited; preference will be given those who plan to continue toward a Doctor of Philosophy degree.

Required: the general requirements, pages 90–96. Of the 24 required semester hours (exclusive of the thesis), a minimum of 18 must be in third-group psychology courses including Psyc 202 and either 203 or 204; six may be in

related fields approved by the department. For detailed requirements consult the chairman of the department.

Doctor of Philosophy in the field of psychology—Prerequisite: the degree of Bachelor of Arts with a major in psychology. Students admitted from other disciplines will be expected to complete prerequisite undergraduate courses to prepare for graduate study in psychology. Qualifying scores on the Miller Analogies Test and the Aptitude Test of the Graduate Record Examination are required for admission.

Required: the general requirements, pages 90–92, 98–100, including (1) the satisfactory completion of the tool requirement (see page 98); (2) Psyc 202, 203-4, Stat 105; and (3) the satisfactory completion of a Preliminary Examination and later, a major Field Examination.

Areas of study: clinical, developmental, experimental, industrial and organizational, and social psychology.

Students electing psychology courses in the freshman year should begin with Psyc 1; with permission of instructor students may elect Psyc 5–6 in the freshman year.

Departmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses in psychology. Six semester hours in psychology courses are prerequisite to all second-group courses in psychology. The departmental prerequisite may be waived with the permission of the instructor.

First Group

1 **General Psychology** (3) Staff

Fundamental principles underlying human behavior. (Fall and spring)

5–6 **Principles and Methods of Psychology** (4–4) Walk, Hashtroudi

Lecture (3 hours), laboratory (3 hours). An experimental approach to understanding behavior; individual and class experiments performed. Psyc 5: sensation, perception, and emotions and their relation to adaptive behavior. Psyc 6: memory, human information processing, learning, and motivation. Laboratory fee, $6 per semester. (Academic year)

8 **Psychology of Motivation and Personality** (3) Tuthill, Bruhn, Holmstrom, Brandt

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized. (Fall and spring)

22 **Introduction to Educational Psychology** (3) Kirkbride, Tanck, McClelland

The contributions of psychology to education; emphasis on learning. (Fall and spring)

29 **Psychology of Childhood** (3) Brandt, Bruhn

Developmental approach to study of the child. Emphasis on the socialization process, learning, and the child's view of the world. (Fall and spring)

Second Group

101 **Abnormal Psychology** (3) Silber, Holmstrom, Bruhn

Causes, diagnosis, treatment, and theories of various types of maladjustments and mental disorders. Prerequisite: six semester hours in psychology or three in psychology and six in a biological science. (Fall and spring)

104 **Ecology and Mental Health** (3) Karp

Examination by field research of the linkages between aspects of the physical environment and mental health. Lectures and student field research projects. (Fall)

105 **The Psychology of Consumer Behavior and Attitudes** (3) Phillips

Consumer behavior and attitudes in regard to advertising, buying habits, consumer action groups and social pressures, and mass persuasion. Lectures and field work. (Spring)

108 **Humanistic Psychology** (3) Mosél

Critical examination of humanistic psychology. Emphasis on role of consciousness in human behavior. Philosophic foundations, existential and phenomenological psychology, the new mentalism. (Spring)

110 **Perception and Understanding in Children** (3) Abravanel

Concepts and research in the area of developmental psychology; emphasis on the growth and development of perception, cognition, and language. (Spring)

112 **Psychology of Adolescence** (3) Bruhn, Johnson

Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems. (Fall and spring)

115 **Psychology of Language and Communication** (3) Mosél

Introduction to psycholinguistics and verbal behavior. Information theory, generative grammar theory, cultural and linguistic structures in the perception and learning of language. (Fall and spring)

117 **Psychology of Art and Picture Perception** (3) Walk

Theories of Arnheim, Gibson, Gombrich, and Goodman as related to art and picture perception; study of cross-cultural research and research with children.

118 **Neuropsychology** (3) Rothblat

Analysis of neural processes underlying behavior. Basic structure and functions of the nervous system, with emphasis on sensory processes, learning and memory, motivation, and emotion. (Fall and spring)

119 **Group Dynamics** (3) Miller

Relationship of the individual to groups, collectivities, and larger social systems. Theory, research, and applications of group and organizational processes, emphasizing contributions of Freud, Lewin, Bion, Mills, Slater, Mann, Miller and Rice. Enrollment limited. (Fall)

121 Psychology of Learning (3) Hashtroudi

Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and animal subjects. (Fall)

122 Psychology and Human Relations (3) Silber

Understanding human relations and T-group techniques by evolving an on-going T-group within the course itself. For junior and senior undergraduate social science majors; open to others with permission of instructor. (Summer)

124 Aggression: Its Nature and Determinants (3) Abravanel

Study of research with adults, children and animals; influence of mass media and cultural comparisons in handling and channeling aggression. Examination of contemporary theories of aggression.

129 Theories of Personality (3) Karp, Poppen

Survey of personality theories; emphasis on their application to problems of individuals. (Fall and spring)

130 Seminar: Political and Social Implications of Current Approaches to Psychological Treatment (3) Karp

Discussion and presentation of recent works, such as those of Szasz, Goffman and various writers on minority liberation, bearing upon the implications for individuals and society of various approaches to psychological treatment, including psychotherapy and behavior modification.

131 Psychological Tests (3) Hunt, Karp, Holmstrom

Survey of psychological tests and their more common uses in business, industry, government, law, medicine, and education. Material fee, $7. (Fall and spring)

132 Socialization in Childhood (3) Brandt

Examination of primary methods by which the child is shaped in terms of social judgment and self control: internalization of controls, assimilation of societal values and parenting procedures. Organized by focus on issues according to developmental level.

144 Personnel and Industrial Psychology (3) Cohen, Mosél

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation and productivity. (Fall and spring)

150 Psychology of Sex Differences (3) Poppen

Relevant biological, psychological, and sociological influences on males and females in the development of sex differences; hormonal differences, gender identity, differential socialization of sons and daughters, masculinity/femininity, cultural evaluation of male and female roles. Survey of relevant psychological theory. Emphasis on empirical research and hypothesis testing.

151 Social Psychology (3) Tuthill, Poppen, Green

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism and war. (Fall and spring)

154 Psychology of Criminology (3) — **Silber**

Examination of many psychological aspects of criminal behavior; personality of criminals and of psychological processes affecting behavior.

156 Psychology of Attitudes and Public Opinion (3) — **Tuthill**

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare. (Spring)

158 Psychology of Interpersonal Attraction (3) — **Green**

Psychological bases for interpersonal attraction; emphasis on personal variables, relevant theoretical approaches and effects of attraction on other behavior.

161 Comparative Psychology (3) — **Caldwell**

Lectures and demonstration on animal psychology. Psychological processes in infrahuman organisms, evolution of behavior, the place of animal experimentation and research in psychology. (Spring)

168 Principles and Techniques in Neuropsychological Research (3) — **Rothblat**

Introduction to basic anatomical, physiological and behavioral techniques used in neuropsychological research to explore relationships between the brain and behavior. Admission by permission of instructor. Laboratory fee, $20. (Spring)

170 Clinical Psychology (3) — **Levy**

An exploration of the history, functions, and problems of the clinical psychologist. Assessment, treatment, community approaches, ethics. Prerequisite: Psyc 101, 131. (Spring)

188 Attitudes toward Death and Dying (3) — **Staff**

Exploration of the many different aspects, attitudes, and experiences associated with the process of death and dying. Limited to juniors and seniors.

191 Independent Research in Psychology (3) — **Staff**

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit. (Fall and spring)

192 Field Experience in Psychology (3) — **Abravanel**

Senior psychology majors will spend a minimum of six hours a week in a local mental health, rehabilitation, school, or community setting. Students registering for this course must have the approval of the instructor by May 15 for the fall semester and by December 15 for the spring semester. (Fall and spring)

196 History and Systems of Psychology (3) — **Caldwell, Rice**

Senior capstone course which includes a survey and integration of the major viewpoints and concepts of psychology. Required of psychology majors. (Fall and spring)

197 Honors Seminar in Psychology (3) — **Staff**

Selected topics in psychology which change from semester to se-

mester. Intended primarily for juniors who plan to enroll in Psy 191 (independent research) in the senior year. May be repeated f credit.

198 **Current Research Issues in Psychology** (3) Sta
Conducted as a seminar. Recent experiments in psychology, inclu ing those performed by members of the class; emphasis on stude participation. May be repeated for credit.

Third Group

Third-group courses are limited to graduate students in psychology, except b special permission of instructor.

202 **Psychological Research Methods and Procedures** (3) Abravanel, Holmstro
Required in all graduate psychology programs. Prerequisite: gradua standing, a laboratory course in psychology, and an elementa course in statistics. (Spring)

203–4 **Experimental Foundations of Psychology** (3–3) Hashtroudi, Rothblat and Sta
Required of doctoral students in psychology during first year o study. Psyc 203: basic issues in learning and motivation. Psyc 20 physiological processes; sensation and perception. (Academic year

205 **Research Methods in Intervention Programs** (3) Kan
Special problems of conducting research in a clinical setting; em phasis on content and method of studies designed to assess effec of therapeutic intervention. Prerequisite: Psyc 202. (Fall)

206 **Methods of Clinical and Personality Research** (3) Rice
Review of techniques especially relevant to research in clinical personality, and social psychology. Scaling methods, multivariate techniques, introduction to the use of computers in data analy Prerequisite: Psyc 202; Stat 105 or equivalent. (Spring)

207–8 **Psychological Assessment** (3–3) Holmstrom, Levy, Silber
Open only to clinical graduate students in the Department of Psy chology. Theoretical and clinical aspects of assessment; includes in terviewing, psychometric tests, and projective techniques. Two-hou laboratory—diagnostic work at clinical facilities. Material fee, $7 pe semester. (Academic year)

209 **Seminar: Psychology of Motivation** (3) Caldwe
Various theoretical approaches to the psychology of motivation systematic concepts and experimental findings deriving from each approach. (Spring)

211 **Assessment of Cognitive Functioning** (3) Levy
Concepts of intelligence and achievement and their assessmen through a variety of individual procedures. Material fee, $7. Ad mission by permission of instructor. (Summer)

212 **Personality Assessment by Projective Techniques** (3) Levy
Methods of personality assessment, primarily the Rorschach. Ma terial fee, $7. Admission by permission of instructor. (Summer)

213–14 **Seminar: Developmental Psychology** (3–3) — Abravanel, Walk, Brandt

Psyc 213: research and theory in developmental psychology, emphasis on perceptual and cognitive development; consideration of the development of social awareness and of genetic-biological growth processes. Psyc 214: current research and theory in perceptual, cognitive, and social development; intensive study of selected research problems. (Academic year)

215 **Personality Assessment by Multiple Procedures** (3) — Brandt, Bruhn

Consideration and use of a wide range of procedures in assessment of personality and psychopathology of children. Prerequisite: Psyc 207–8 or 211 and 212. Graduate students in fields other than psychology admitted by permission of instructor. Material fee, $7. (Summer)

216 **Psychological Assessment by Graphic Means** (3) — Levy

Examination of graphic procedures for assessment of intelligence and personality; clinical use and evidence of validity. Common interpretive principles sought. Human figure drawings and free paintings as examples. Admission by permission of instructor. (Fall)

218 **Seminar: Systems of Psychotherapy** (3) — Silber

Introduction to theory and technique of psychotherapeutic approaches: psychoanalytic, ego-centered, nondirective, transactional, and others. Original sources surveyed. (Summer)

219 **Group Dynamics** (3) — Miller

Relationship of the individual to groups, collectivities, and larger social systems. Theory, research, and applications of group and organizational processes, emphasizing contributions of Freud, Lewin, Bion, Mills, Slater, Mann, Miller and Rice. Enrollment limited. (Fall)

220 **Seminar: Abnormal Psychology** (3) — Miller

Study of selected problems of psychopathology. (Fall)

221–22 **Seminar: Group Psychotherapy** (3–3) — Borriello

For graduate students in the clinical psychology program. Open to others if space permits and with permission of instructor. Psyc 221: survey of group therapy approaches; Psyc 222: supervised experience with therapeutic groups. Prerequisite to Psyc 222: Psyc 221. (Academic year)

223 **Seminar: Learning** (3) — Hashtroudi

Selected topics of current research interest in the psychology of learning. (Spring)

225 **Seminar: Child Psychotherapy** (3) — Bruhn

Theory and practice of insight-oriented psychotherapy with children. Class observation of an ongoing treatment case. Supervised treatment of a child in a practicum setting. Permission of instructor required for all students except graduate students in the child clinical track. (Spring)

226 **Seminar: Clinical Psychology of Childhood and Adolescence** (3) — Brandt

For graduate students in psychology; open to others with permission

of instructor, if space permits. Exploration of major topics concern ing psychopathology in children and adolescents; discussion o nosological issues with emphasis on theoretical and research litera ture.

227–28 **Seminar: Principles of Psychotherapy** (3–3) Kahn

For graduate students in clinical psychology; open to others, with permission of instructor, only if space permits. Patient's needs and demands on the therapist. Case participation heavily relied upon. Prerequisite: Psyc 218. (Academic year)

229 **Seminar: Principles of Behavior Change** (3) Phillips

Stimulus-organism-response variables and their interactions, with emphasis on learning theory as applied to clinical problems. (Fall)

231 **Development of Psychometric Instruments** (3) Mosel

Quantitative techniques and principles used in construction, stan dardization, and evaluation of personality and ability measures in research and practice; quantification of human judgment for mea surement purposes. Prerequisite: course in tests and measurement and an elementary course in statistics. (Fall)

232 **Ego Psychology and Theories of Object Relations** (3) Holmstrom

Emphasis on theoretical contributions of Freud, Hartmann, Kris, Klein, Rapaport, Kernberg, and others. Assessment and treatment are addressed, primarily with reference to investigations of borderline and characterological disorders. Permission of instructor required for all students except those in clinical psychology. (Spring)

234 **Seminar: Theory of Psychological Measurement** (3) Mosel

Development of classical axiomatic-deductive theory underlying ma jor notions in the construction and evaluation of psychological tests. (Spring)

236 **Seminar: Community Mental Health** (3) Miller

For graduate students in the department of psychology; open to others, with permission of instructor, only if space permits. Survey of issues and techniques in community mental health; emphasis on educational systems and community mental health issues. (Spring

240 **Seminar: Selected Topics in Research in Psychopathology** (3) Silber

Examination of current research and theory in psychopathology. Major focus will be on character disorders (1979) and psychoneuroses (1980). (Spring)

245 **Seminar: Organizational Behavior** (3) Mosel

Analysis of organizational behavior; emphasis on motivation and pro ductivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job de sign. (Fall)

246 **Seminar: Personnel Measurement Techniques** (3) Mosel

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assess ment interviews, and performance ratings.

247 **Seminar: Psychological Tests and Equal Opportunity** (3) Hunt

Technical, professional, practical, and legal demands of psychological test use. Current problems of fairness, discrimination against minorities, and test validation. (Summer)

248 **Organizational Behavior Research Applied to Organizational Intervention and Change** (3) Cohen

Emphasis on development of models of organizational effectiveness; design of valid diagnostic instruments; implementation of research strategies; establishment of program-evaluation criteria. (Spring, even years)

251 **Seminar: Advanced Social Psychology** (3) Tuthill, Poppen, Green

Current research and theory: motivation and cognition, dissonance, social interaction theory, interpersonal processes, group dynamics, group conflict. (Fall)

252 **Research Methods in Social Psychology** (3) Tuthill, Poppen, White, Green

Selected methods such as public opinion polling, attitude scaling, interviewing, content analysis, naturalistic observation, field research or laboratory experimentation. (Fall and spring)

254 **Seminar: Experimental Social Psychology** (3) Tuthill

Experimental study of small groups, group climates, interaction process analysis. Lewin's field-theoretical approach to individual and group processes. (Spring, odd years)

256 **Seminar: Psychological Causes of War** (3) White

An attempt to integrate evidence from animal behavior, child behavior, anthropology, psychiatry, and recent history, including World Wars I and II and the present East-West conflict. (Spring)

257 **Current Topics in Social Psychology** (3)

Advanced seminar. (Fall and spring)

258 **Seminar: Attitude Change** (3) Tuthill

Review of recent research literature on attitude formation and change. Examination of theories of attitude change and experimental findings. (Spring, even years)

261 **Seminar: International Communication** (3) Mosél

Primarily for students in the School of Government and Business Administration and School of Public and International Affairs. Communicating information and effecting attitude change across cultures by mass media. Psychocultural factors and the functions of mass communication in the development of transitional societies. (Spring)

268 **Seminar: Neuropsychology** (3) Rothblat

Selected problems in research relating the brain and behavior. Independent topics each semester such as sensory processing, brain development and behavior, clinical aspects of nervous system function.

272 **Seminar: Theories of Personality** (3) Caldw
Emphasis on theoretical problems and methodology in the field personality study. (Fall, odd years)

274 **Comparative Psychology and Ethology** (3) Caldw
Synthesis of the principles and findings of ethology and comparati psychology. Examination of the theories and findings of Lore Tinbergen, and Jakob von Uexküll in the light of recent experimen investigations. (Fall, even years)

289 **Seminar: Current Topics in Experimental Psychology** (3) St
Review and discussion of contemporary research and theory in specialized field of psychological study, by leaders in the field. dependent topics each semester; may be repeated for credit. (F and spring)

291 **Theories of Organizational Behavior** (3) Cole
Examination of current theoretical models and research. (Sprin

292 **Seminar: Perception** (3) Wa
Study of current research and theory in the experimental psychol of perception. (Spring)

293 **Seminar: Psychology of Thinking** (3) Ri
Review of basic theoretical positions and research concerning t processes of cognition: memory, concept formation, and reasoni

295 **Independent Research in Psychology** (3) St
Individual library or experimental research under supervision staff member. Arrangements must be made with sponsoring facul member prior to registration. May be repeated for credit. (F and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) St
Limited to students preparing for the Doctor of Philosophy ma field examination. May be repeated for credit. (Fall and spring

399 **Dissertation Research** (arr.) St
Limited to Doctor of Philosophy candidates. May be repeated credit. (Fall and spring)

PSYCHIATRY AND BEHAVIORAL SCIENCES

The following course, offered by the Department of Psychiatry and Behavio Sciences in the University's School of Medicine and Health Sciences, is op to advanced graduate students in clinical psychology. For detailed descripti consult the *School of Medicine and Health Sciences Bulletin*.

365–66 **Seminar: Clinical Introduction to Family Diagnosis and Therapy** (3–3)

PUBLIC ADMINISTRATION—GRADUATE PROGRAMS

Professors D.S. Brown, W. Sommers *(Emeritus)*
Professorial Lecturers B. Posner, J.L. Westrate
Associate Professors S.R. Chitwood, M.M. Harmon, B.L. Catron *(Chairman)*, A.E. Merget, D.O. Porter
Associate Professorial Lecturers J.F. Magnotti, Jr., T. Maher
Assistant Professor C.W. Washington
Assistant Professorial Lecturer M.B. Young

Programs of study in Public Administration leading to the degrees of Master of Public Administration and Doctor of Public Administration are offered by the School of Government and Business Administration (see pages 133–64).

Third Group

205 **Introduction to Public Administration and Management** (3) Brown, Chitwood, Porter

Provides frame of reference for study of public administration. Historical development, contemporary approaches, roles of the public manager. Ethics and norms, administrative responsibility and public interest. Management in the public sector. (Fall and spring)

213 **Administration in the Federal Government** (3) Porter, Westrate

Critical analysis of federal administrative organizations as an integral part of the political system. Roles of Congress, the President, the courts, interest groups, political parties and the public in the public decisional process. Special attention to centripetal and centrifugal forces. (Fall and spring)

214 **Policy Analysis in Public Administration** (3) Catron

Introduction to systematic analysis of public policy alternatives. Development of conceptual frameworks for differentiating types of public policies, e.g., distributive, regulatory, redistributive; examination of the contribution of economic, quantitative and research techniques to the development, administration and evaluation of these policies. (Fall and spring)

217 **Seminar: Development Administration I** (3) Belaunde-Terry

The nature of underdevelopment. Specific problems of less developed countries. National cultures and political and administrative systems. The giving of assistance: types of foreign aid; problems of working with aid givers. (Fall)

218 **Seminar: Development Administration II** (3) Brown

Problem of the transfer of administrative capability from one country to another. Political and administrative development. Unilateral and multilateral approaches. The role of the innovator. Strategies of administrative development. (Spring)

220 **Law and the Public Administrator** (3) Chitwood

Exploration and analysis of the functions of law in a democratic society. Emphasis is placed upon the procedural, historical and jurisprudential dimensions of American law. This broad perspective seeks to convey a more perceptive understanding of the law as a

legal and moral force guiding and constraining public decision mak
ing. (Spring)

221 Organization Theory and the Public Sector (3) Catron, Harmon, Washington

Analysis of organization theory with special focus on public organi
zations; current issues in organization theory; decision-making, the
organizational environment and the changing nature of organizations
in a post-industrial society. (Fall and spring)

223 Behavioral Factors in Large and Complex Organizations (3) Brown

Analysis of the nature and characteristics of large organizations.
Bureaucracies and their behavioral patterns; dysfunctionalism. Ap
proaches to policy guidance and leadership, particularly in large
public organizations; influence and control systems. Future trends.
(Fall and spring)

231 Public Personnel Administration (3) Staff

Survey of basic principles and functions of personnel administration
in the public service. Roles of personnel management, recruitment,
placement, wage and salary administration, training, retirement and
other personnel functions. (Fall)

232 Problems in Public Personnel Management (3) Staff

Analysis and evaluation of major personnel management problems
in government; employee-management relations; interagency and in
tergovernmental relationships. Impact of automation. Evaluation of
personnel systems. (Spring)

233 Seminar: Manpower Development and Utilization (3) Porter

Examination of public and private manpower trends, problems, poli
cies, and programs. Exploration of approaches, old and new, to
manpower development and utilization. Analysis of impact of eco
nomic, political, and social factors on manpower. Students will
select a specific area for individual investigation. (Fall)

235 Seminar: Technology Change and Professional Human Resource Planning (3) Roman

Research, discussion and readings dealing with human resource prob
lems arising from automation and other technological change.
Evaluation of these developments in government, business, and edu
cational organizations, and their implications for productivity, em
ployment, training, and education. Analysis of economic, political,
and social factors influencing public and private human resource
policies. (Spring)

236 Labor-Management Relations in the Public Sector (3) Staff

Principles and current issues in public sector labor relations: col
lective bargaining and the merit concept, scope of bargaining, repre
sentation elections, unfair practices, grievance procedures, bilateral
ism and the management process.

245 Intergovernmental Relations (3) Washington

Assessment of the impacts and consequences of changes in the ad
ministration of intergovernmental policies and programs in the fed
eral system. Legislation, roles and responsibilities of federal, state

regional and local systems will be examined from both theoretical and practical vantage points to understand their effects. (Fall and spring)

246 **Dynamics of Citizen Participation in Administration** (3) Staff
Examination of the nature of participation in a democratic society. An analysis of the characteristics and dynamics of citizen-based organizations. Exploration of effective methods or models by which administrators may utilize citizen participation.

248 **Financing Local Government** (3) Merget
Analysis of the structure and administration of public finance in local governments. Includes the financing of services through municipal taxation and other revenue sources, debt administration and implications of the budgetary process. (Fall and spring)

249 **Urban Public Policy** (3) Washington
Examination of views of the city. Emphasis on urban systems in their social, political, economic and physical aspects. Against the background of urban politics and administration, will address such central functional areas as health, education, welfare, crime, poverty, transportation and housing. (Fall and spring)

250 **Administration of State and Local Governments** (3) Washington
Examination of state and local governmental structures and functions, public and private demands, their place within the federal system, their limitations and alternatives available to encourage more effective administration. (Fall and spring)

251 **Governmental Budgeting** (3) Merget, Porter
Survey of the basic concepts, principles and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process. (Fall and spring)

252 **Public Expenditure Analysis and Planning** (3) Merget, Porter
Intensive analysis of managerial and economic procedures and techniques used by government agencies for planning, allocating and managing scarce resources in the achievement of public programs. Topics discussed include benefit-cost analysis, program budgeting, systems analysis, present value analysis, and government contracting. (Fall and spring)

260 **Policy Formulation and Administration** (3) Harmon
Normative and analytical models of the policy process; effects of decision-making and institutional arrangements on public policy formulation and implementation. (Fall and spring)

262 **Seminar: Science, Technology and Public Policy** (3) Black
The impact of science and technology upon public administration in terms of both administrative practice and national policies. (Spring)

290 **Special Topics in Public Administration** (3) Staff
Experimental course offering; new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

292 **Public Program Evaluation** (3) Catron
Theory and practice of program evaluation and evaluative research.

Exploration of scope and limitations of current practice in evalu due to economic, political, social and administrative factors. E nation of methodological considerations for data collection, an and dissemination. Students will conduct individual evaluative ects. (Spring)

294 **Statistical Applications in Public Administration** (3)
Use of statistics and computers in research and program evalua Development of basic statistical competency; frequency distrib graphic presentation, sampling, central tendency, variability, co tion, probability, regression, nonparametric tests; computer ance.

295 **Research Methods** (3)
Theory and practice in research methodology. Data source gathering, research models and designs, analysis and testing trols, interpretation and presentation of findings. (Fall and s

298 **Directed Readings and Research in Public Administration** (3)
Supervised reading in selected fields within public adminis Admission by permission of instructor. May be repeated on credit. (Fall and spring)

299 **Thesis Seminar** (3)
Examination of thesis standards, research philosophy and m ology in public administration. (Fall and spring)

300 **Thesis Research** (3)
(Fall and spring)

Fourth Group

Fourth-group courses are limited to doctoral students. The offered as the demand requires.

311–12 **Seminar: Public-Private Sector Institutions and Relationships**

323 **Seminar: The Large and Complex Organization** (3)
Unique problems of large, complex organizations: public, p and mixed. Emerging concepts and theories. Selected issues.

373 **Seminar: Public Administration and American Political and Social Institutions** (3)
Supervised in depth study of contemporary literature in s fields and of research methodology in public administration.

374 **Seminar: Trends in Public Administration Theory** (3)
Survey of contemporary normative and epistemological iss public administration theory and practice. Analysis of the pa present influence of logical positivism, behavioralism, hum existentialism and phenomenology.

377 **Seminar: Social Action and Public Policy** (3)
Interdisciplinary approach to foundations of public policy with on theoretical problems of social action. Interrelation of theor practice. Decision and management as human actions.

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Public Administration general examination. May be repeated for credit.

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Public Administration candidates. May be repeated for credit.

PUBLIC AND INTERNATIONAL AFFAIRS

Professors R.H. Davison, J.W. Kendrick, R.B. Thompson, J.N. Mosél, F.H. Michael *(Emeritus)*, J. Aschheim, H.L. LeBlanc. R.K. White *(Emeritus)*, A. Gyorgy, B. Nimer, R.P. Sharkey, C.T. Stewart, Jr., J.W. Robb, H.B. Yakobson, H.C. Hinton, H.M. Sachar, G. Stambuk, H. Solomon, V. Petrov, B.M. Sapin, C. Shih, R.K. Lewis, C. Hsieh, G. Sigur, M. Gordon, P.P. Hill, J.A. Morgan, Jr., R. Thornton, H. Pollack *(Research)*, B. Reich, Y. Kim, R.M. Dunn, Jr., C.A. Moser, M.A. Holman
Adjunct Professors T.F. Carroll, A. Halpern, D. Robinson
Professorial Lecturers J. Hardt, T. Hsia, B. Ramundo, T.W. Wolfe, E.M. Hadley, J.F. Coates
Associate Professors W.R. Johnson, R.Y. Yin, J.K. McDonald, C.F. Elliott, C.A. Linden, S.J. Wayne, J.M. Logsdon, P.F. Klarén, H.R. Nau, J.C. Lowe, A.H. Teich, E.O. Pederson, A.M. Yezer, R.S. Goldfarb, R.L. Cole
Adjunct Associate Professor V.T. Coates
Associate Professorial Lecturer P. True
Assistant Professors G.C.Y. Wang, D.L. Lee, D. Fischer, L.P. Ribuffo, C.M. Aho, J.J. Cordes, G.C. Mackenzie, S. Shaffer, C. McClintock, R. Sines, A.K. Fitzsimmons, M. Sodaro *(Visiting)*, S. Wolchik *(Visiting)*

Programs of study in Chinese language and literature, East Asian studies (China and Japan), international affairs, public affairs, and urban affairs leading to the degree of Bachelor of Arts and programs of study in East Asian studies, international affairs, Latin American studies, public affairs, Russian studies, and science, technology, and public policy leading to the degree of Masters of Arts are offered by the School of Public and International Affairs (see pages 165–82).

INTERNATIONAL AFFAIRS

The following courses are offered only in the War College curriculum:

260 **Fundamentals of National Power** (3)

261 **International and U.S. Foreign Policy** (3)

262 **National Security Policy of the United States** (3)

297 **Readings in International Affairs** (1, 2, or 3)

299–300 **Thesis Research** (3–3)

RELIGION

Professors R.G. Jones *(Chairman)*, H.E. Yeide, Jr., D. Wallace, Jr.
Associate Professor A.J. Hiltebeitel
Associate Professorial Lecturer E.S. Jospe
Assistant Professors S.A. Quitslund, D.A. Altshuler
Assistant Professorial Lecturer D.M. Yeager

Bachelor of Arts with a major in religion (departmental)—The following quirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Stude should consult the departmental advisor regarding courses to be taken to sati the requirements for meaningful initiation into the social studies and the natu and mathematical sciences.)

2. Prerequisite courses—six hours from among Religion 9, 10, 59, 60.

3. Four required courses in related areas—(a) six semester hours in studies cultures other than American and English (preferably a foreign language) (b) six semester hours in either literature, philosophy, or history.

4. Required courses in the major—thirty semester hours including at twenty-one hours of upper-level courses. Twelve of these hours must be cho from one of the following religious traditions: Judaism (Rel 103, 107, 113, 115, 116, 174, 184), Christianity (Rel 104, 105, 122, 124, 143, 144, 145, 146 religions of India (Rel 157, 158, 159, 160, 162). Appropriate graduate semin may be approved as substitutions for advanced-level courses. The progr must include Rel 101 and at least one course in each of the following are Hebrew Scriptures, New Testament, Eastern religions, Western religions.

An honors thesis course (Rel 191) is available for eligible students.

It is recommended that students include the study of foreign languages their undergraduate program, including Hebrew for those specializing in Judai and biblical studies, Greek for those specializing in early Christianity (inclu the New Testament), Sanskrit for those specializing in the religions of Ind All students expecting to enter graduate school are urged to study French German.

Master of Arts in the field of religion—Prerequisite: the degree of Bachelor Arts with a major in religion from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. Of the 24 semester ho of required courses (exclusive of the thesis), at least 12 must be in third-gro religion courses; a maximum of nine may be in a closely related field outsi the Department of Religion as approved by the department. The Master's C prehensive Examination must cover three fields (the thesis research must be one of these three fields) selected from the following: the Old Testament, New Testament, history of Christianity, Judaism, history of religion in Amer modern religious thought, ethics, sociology of religion, and history of religi A reading knowledge examination, usually in French or German, is requ however, Hebrew or Greek is acceptable for those students whose thesis is in the Biblical field and Sanskrit or an Eastern language for those wh thesis area is in the history of religions.

Master of Arts in the field of religious education—Prerequisite: the de of Bachelor of Arts with a major in religion from this University, or an equi lent degree. The undergraduate program should have included the follo courses or equivalent: Anth 1; Educ 108; Psyc 1, 22, and 29; SpDr 1 or 15

Required: the general requirements, pages 90–98. Of the 24 semester h of required courses (exclusive of the thesis), at least six must be in third-gr religion courses; a maximum of 12 may be in a closely related field outside Department of Religion as approved by the department.

*Master of Arts in the field of religion and medical care**—Prerequisite: (1) the degree of Bachelor of Arts with a major in religion from this University, or an equivalent degree; (2) a first professional theological degree; or (3) acceptable academic work required of entering medical students who have not earned a bachelor's degree, but who are pursuing the degree of Doctor of Medicine.

Required: the general requirements, pages 90–98. The program of study consists of 36 semester hours of approved course work with or without a thesis. Students must elect course work covering four fields selected from clinical pastoral care, religion, sociology, psychology, health care administration and medicine. The course work in these fields must be distributed as follows: 12 semester hours each selected from two fields and at least six hours in clinical pastoral care. The Master's Comprehensive Examination must cover three fields selected from the list above, one of which, as approved by the department, must be outside of the Department of Religion. Supervised clinical education may be offered as a tool subject in lieu of the required reading knowledge examination in a foreign language.

Master of Arts in the field of history of religions—Hinduism—(Consortium of Universities program). Prerequisite: the Bachelor of Arts degree from this University with suitable background in the study of religion of South Asia or an equivalent degree.

Required: the general requirements, pages 90–98. The program of study consists of 24 hours of course work (exclusive of thesis) selected from upper-division and graduate courses of member universities of the Consortium as determined by the Department of Religion, including a sequence of four courses in the literature of the Hindu tradition and one course in method in history of religions. The Master's Comprehensive Examination must cover the following: methods in the study of religions, thematic comparisons between the Hindu tradition and at least two other religious traditions, including at least one Western tradition, and a special field in Hindu tradition. A reading knowledge examination in a foreign language, usually in French or German, will be required, and a student must take at least two semesters of either Sanskrit or Hindi in addition to the 30 hours of required courses for graduate credit. More complete information regarding courses and requirements is available from the program advisor, Associate Professor A. J. Hiltebeitel, Department of Religion.

Doctor of Philosophy in the field of American religious history (offered in cooperation with the Department of History)—Required: the general requirements, pages 90–92, 98–100. The General Examination must cover four fields, including two from the Department of Religion (history of religion in America and either early Christianity or European Christianity since 1500) and two from the Department of History (generally American social history and one other).

First Group

9 The Hebrew Scriptures (3) **Jones**

Historical and literary study of the Hebrew Scriptures (Old Testament) with consideration of development of religious ideas, institutions, and outstanding personalities. (Fall and spring)

10 The New Testament (3) **Jones**

Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles. (Fall and spring)

* Certain courses in this program are offered only through off-campus centers of the College of General Studies.

21 **Religion and Man's Search for Meaning** (3) Yeid
Traditional religious concepts, language of contemporary religio
amidst modern scientific and secular intellectual tendencies, and th
place of religion in today's society. (Fall)

22 **Religion and Contemporary Social Issues** (3) Yeid
Illumination of social problems by ethical reflection; examination
ethical perspectives as stimuli and barriers to social change; tec
niques for maintaining social values and seeking change. (Spring

23 **Judaism: Identities and Ideas** (3) Altshule
Exploration of important practices and beliefs in classical and mo
ern times; study of people and texts which confront tradition an
change. (Fall)

57 **Eastern Spiritual Movements and the Modern West** (3) Staff
Impact of Eastern religions on Western culture (mainly British an
American) through the widening of cultural horizons, the lure of th
East, the popularization of the occult, transcendentalism, the "met
physical movements," and the arrival of gurus and other missionaries
from the East. Modern Western influences on Eastern religions
background. (Summer)

59 **Religions of the East** (3) Hiltebeitel
Origins, evolution, and contemporary status in historical context
primitive religions, Hinduism, Buddhism, Taoism, Confucianism, an
Shinto. (Fall and spring)

60 **Religions of the West and Near East** (3) Wallace
History of religion in the ancient world (e.g., Greece) and of Judaism
Christianity, and Islam, including modern developments. (Fall an
Spring)

*91 **East Asia—Past and Present** (3) Johnson and Associated Faculty
An interdisciplinary course, introducing the student to a comprehen
sive and integrated understanding of the civilization and present
problems of East Asia.

Second Group

101 **Theories in the Study of Religion** (3) Staff
Seminar taught jointly by the faculty of the Department of Religion
Analysis of different ways in which religious phenomena can be st
proached. Readings and discussion of some of the epoch-makin
books in the development of the study of religion. (Fall)

103 **The Prophets** (3) Quitslund
Development of prophetism in the Old Testament; cultural, economi
psychological, and religious factors; elements of lasting value in th
prophetic teaching. Study of selected prophets. (Spring)

104 **The Life and Thought of Jesus** (3) Quitslund
Comprehensive study of the life and teachings of Jesus with criti
attention to sources. (Fall)

* An interdepartmental course offered by the Departments of Religion, East Asian Languages and Literatures, Economics, Geography and Regional Science, History, Philosophy, and Political Science.

105 **The Life and Thought of Paul** (3) Quitslund

Backgrounds of early Christianity, first-century religious and social conditions affecting the spread of Christianity, the life and journeys of Paul, Paul's presentation of the Christian faith. (Spring)

107 **Rabbinic Literature and Thought** (3) Altshuler

Readings of the Mishna, Talmud, exegetical midrashim and targumin in English translation. Methods of literary and historical analysis introduced and applied. Individual research projects. (Fall)

111 **Myth, Epic and Novel** (3) Hiltebeitel

Religious themes and images of the hero and their cultural significance in literature: e.g., Indo-European, Biblical, Babylonian narrative traditions; Greek epic and drama; Dante, Milton, Dostoevsky, Kafka, Hesse, Faulkner, Beckett.

113 **Early Post-Biblical Judaism** (3) Altshuler

History of Judaism from the time of Ezra through the destruction of Jerusalem in 70 CE—canonization of the Pentateuch, Hellenism, Maccabean revolt, growth of sectarian movements, Herod, ferment against Rome in context of Eastern and Western political currents. Use of primary sources, especially the Bible, Josephus, and rabbinic and noncanonical writings.

114 **Judaism in the Rabbinic Period** (3) Altshuler

From 70 CE through end of rabbinic period. Focus on religious responses to destruction of the Temple; apocalyptic thinking and revolt of Bar Cochba; rabbinic and patriarchal responses to Roman authority; Tannaitic and Amoraic Judaism in Palestine and Babylonia; mystical and folk religion phenomena preserved in art and literature.

115 **Judaism in the Medieval Period** (3) Altshuler

History of relations between Jews and non-Jews. Daily life and education of the ordinary Jew; rabbinical law and interpretation of scripture; Jewish philosophers, mystics, sects and messianic movements. (Fall)

116 **Judaism after Emancipation** (3) Altshuler

Transformation of community and beliefs among Jews beginning with catalyst of their political emancipation. Responses to beginnings of modernity among Jews in Europe, America, and Israel. (Spring)

122 **Christian Ethics and Modern Society** (3) Yeide

Nature and principles of Christian life as developed by the Christian community; problems of personal conduct; application to family, social, and economic institutions. (Fall)

124 **Contemporary Movements in Theology** (3) Quitslund

Theological approach and systems of a selected number of modern theologians.

126 **Western Mysticism** (3) Quitslund

Study of the phenomenon of religious experience and of selected mystics in Judaism, Christianity, and Islam. (Fall)

127 **Medicine, Religion, and Healing** (1) Yeide

Total care concept. Importance of religion in medical practice for pa-

tient and physician. Concept of the professional, the clergy's role healing, religious prespective on issues in medical ethics. (Spri

137 **The Land of Israel and the Growth of the Western Religions** (6)

143 **Early Christianity and the Spiritual Life of the Ancient World** (3)
Rise and development of Christianity in relation to the cultu philosophy, mystery religions, and general religious life of the Gre Roman world to A.D. 500.

144 **Medieval Faith and Symbolism** (3)
Christian life and thought in the Middle Ages; mystics, saints, po and philosophers.

145 **Religious Currents in the Renaissance and Reformation** (3)
Transformation of Western man's understanding of his identity destiny from the end of the Middle Ages to the Age of Rea (Fall)

146 **Christianity in the Modern World** (3)
Changing religious styles and patterns since the Age of Reason seen in theology, literature, political life, and religious institutio (Spring)

157 **Indian Philosophy and Mysticism** (3)
Indian speculative and mystical traditions; late *Vedas*, *Upanish Bhagavad Gita*, Buddhist, and Hindu soteriological systems.

158 **Ancient Indian Literature and Religion** (3)
Studies of foundational texts of Hinduism, especially *Rig Ve Brahmanas*, *Mahabharata*, (including the *Bhagavad Gita*); atten Hinduism's archaic and seminal themes.

159 **Mythologies of India** (3)
The lore of Indian gods (Vedic, Puranic), heroes (epics), and men (Hindu, Buddhist, Jain, Tantric); ties with Indian caste, cosmology, and spiritual ideals. (Spring)

160 **Buddhism** (3)
Origin, development, and contemporary status of Buddhist life thought; it's impact on Asian culture. (Fall)

161 **Islam** (3)
Origin, development, and contemporary status of Islamic life thought; its impact on the Near East.

162 **Symbolism in the History of Religions** (3)
Religious symbolism, myth, legend, and ritual in the religions o world; various theoretical analyses. (Fall)

172 **Religion in American Culture** (3)
Growth of religious bodies and institutions in relation to Amer culture, development of religious thought, and analysis of the temporary religious scene. (Fall)

174 **American Judaism** (3) **Altshuler**
Religious thought and institutions with emphasis on contemporary Judaism. Mythic and ritual life of American Jews, including responses to Israel, diaspora, the Holocaust, family and community life. (Spring)

181 **Woman in Western Religion** (3) Quitslund
Historical, theological, and ethical investigation of the image and role of woman in Judaism and Christianity; special consideration of the Biblical experience, the sexual qualifications for religious office, use of male-female images and languages, and contemporary issues. (Fall)

184 **The Thought of Martin Buber** (3) **Jospe**
Basic principles underlying the Life of Dialogue and application of those principles to all strata of life from interpersonal relationships to the religious realm.

191 **Senior Honors Thesis** (3) Staff
Required of and open only to undergraduate honors candidates in religion. (Fall and spring)

Third Group

200–10 **Seminar: Biblical Studies** (3–3) **Jones**
Main problems of Biblical literary, historical, and theological criticism. (Rel 209—fall; Rel 210—spring)

213 **Seminar: Inter-testamental Judaism** (3) Altshuler
Historical and religious development of Judaism as seen in the Apocrypha, Pseudepigrapha, Dead Sea Scrolls, Philo and early Rabbinism. (Spring)

222 **Seminar: Christian Ethics** (3) **Yeide**
Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection. (Spring)

235 **Seminar: Roman Catholicism in the Modern World** (3) Quitslund
Important leaders and their ideas in selected developments since 1500—doctrinal, spiritual, biblical, liturgical, and ecumenical. (Spring)

237 **Seminar: Theological Analysis** (3) **Quitslund**
Historical and topical study of the development of important ideas in such areas as Christology, soteriology, and ecclesiology.

238 **Seminar: Contemporary Jewish Religious Thought** (3) Altshuler
Selected topics.

262 **Seminar: History of Eastern Religions** (3) **Hiltebeitel**
Selected topics. (Spring)

271 **Seminar: American Religious History to 1830** (3) **Wallace**
Religious thought and life during the Colonial and early National period.

273 **Seminar: American Religious History since 1830** (3) Wallace
Religious thought and life from the Civil War to the present (Spring)

291–92 **Readings and Research** (3–3) Staff
Investigation of special problems. (Academic year)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

ROMANCE LANGUAGES AND LITERATURES

Professors J.W. Robb, G.E. Mazzeo *(Chairman)*, J.A. Frey, J.L. Métivier, Jr., J.F. Burks
Associate Professors M.A.B. Coffland, P.G. Sáenz, C. Ludlow, S.R. Barnett
Assistant Professors G.P. Huvé, J.E. Hicks, I. Azar, J.M. Thibault

Bachelor of Arts with a field-of-study major in (1) French language and literature, (2) Spanish language and literature, (3) Spanish-American literature, or (4) any approved combination selected from two of the preceding fields—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the social studies and the natural and mathematical sciences.)

2. Prerequisite courses—Fren 1–2, 3–4, 9–10, or equivalent; or Span 1–2, 3–4, 9–10, or equivalent.

3. Required introductory literature courses—Fren 51–52 or 91–92, or Span 51–52 or 91–92.

4. Required for the major:

There is no specific program of required courses. The student, however, is expected to demonstrate a knowledge of his or her field in breadth and depth either by passing a comprehensive examination at the end of the senior year, or by satisfactorily completing a comprehensive project during the course of the senior year. A proseminar is required as follows: Fren 199–200 for French language and literature majors; Span 199–200 for Hispanic language and literature majors.

Master of Arts in the fields of (1) French literature, (2) Spanish literature, (3) Spanish-American literature, or (4) an approved combination of Spanish and Spanish-American literatures—Prerequisite: the degree of Bachelor of Arts in the appropriate field from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to six semester hours), or, with the approval of the department, a student may elect a program of study consisting of 36 semester hours of approved course work without a thesis.

Doctor of Philosophy fields of study in Romance literatures—Required: the general requirements, pages 90–92, 98–100. There are four fields: French literature; Spanish literature; Spanish-American literature; and any approved combination of French, Spanish, or Spanish-American literature.

Bachelor of Arts in Education with teaching fields in French and in Spanish—Prerequisite: the education curriculum, pages 113–14.

Required: the French option or the Spanish option and the professional courses listed on page 117.

Placement Examinations: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

FRENCH

Departmental prerequisite: Fren 3–4 or 6, or equivalent, is prerequisite to all second-group courses in French, except for courses offered in English translation.

First Group

1–2 **First-year French** (3–3) Huvé and Staff

A year course; credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, readings. Oral practice in language laboratory. Laboratory fee, $17.50 per semester. (Fall and spring)

3–4 **Second-year French** (3–3) Huvé and Staff

A year course; credit toward a degree at this University given on completion of Fren 4. Conversation, grammar, composition, reading in modern French prose. Oral practice in language laboratory. Prerequisite: Fren 1–2. Laboratory fee, $17.50 per semester. (Fall and spring)

6 **Second-year French** (6) Huvé and Staff

Lecture (3 hours), discussion (3 hours). Intensive course which covers material of Fren 3–4. Prerequisite: Grade of *B* or better in Fren 2. Laboratory fee, $17.50. (Fall and spring)

9 **Expression orale du français contemporain** (3) Thibault and Staff

Emphasis on conversation in a controlled situation. Special attention to the acquisition and active use of a flexible vocabulary. Oral reports. Prerequisite: Fren 4 or equivalent. (Fall and spring)

10 **Cours de syntaxe** (3) Thibault and Staff

Grammar, composition, study of vocabulary and syntax. Prerequisite: Fren 4 or equivalent. (Fall and spring)

49 **French for Graduate Students** (0) Staff

For graduate students preparing for reading examinations. No academic credit. Tuition is charged at the rate of three credit hours, plus University Center fee. (Fall and spring)

51–52 **Survey of French Literature** (3–3) Métivier and Staff

Readings in French literature from the Middle Ages to the present. Lectures, readings, and informal discussions. (Fall and spring)

60 **Contemporary French Civilization** (3) Ludlow

Study of contemporary France as seen through its cultural, political, economic and social life, its geography, language, population and character. Class lectures and discussion of texts supplemented by slides, films, tapes and records. Conducted in English. (Summer)

91–92 **Analyse de texte** (3–3)
Methodology and vocabulary of literary criticism; application of principles of *explication de texte* to selections from prose, drama, and poetry from the Renaissance to the present. (Academic year)

Second Group

103 **Diction, phonétique appliquée** (3)
The sound of French; elements of articulatory phonetics. Exercises in reading and speech with attention to pronunciation, accent, rhythm, and intonation. (Fall)

108 **Cours de grammaire avancée** (3)
(Spring)

109 **La Langue pratique** (3)
Advanced level study. Practical and everyday vocabularies developed through systematic drills of syntactical patterns. (Fall and spring)

110 **Cours de stylistique** (3)
Advanced study of vocabulary and syntax with emphasis on stylistic devices and techniques of translation. (Fall and spring)

119–20 **French Literature of the Middle Ages and the Renaissance** (3–3)
Literary history and the development of ideas. Les *chansons de geste*, courtly literature, satire, the theater, lyric and didactic poetry. Rabelais, Montaigne, La Pléiade. Class analysis of texts, collateral readings.

121–22 **17th-Century French Literature** (3–3)
Drama, fiction, poetry, criticism and philosophy in the Age of Classicism. (Academic year)

123–24 **18th-Century French Literature** (3–3)
History, philosophy, criticism, letters, drama, fiction, poetry, the "salons," idea of progress, idea of science. Class analysis of texts, collateral reading.

125–26 **19th-Century French Literature** (3–3)
Poetry, drama, and novel of the 19th century; emphasis on stylistic analysis. Offered in English translation, 1978–79 and alternate years; offered in French, 1979–80 and alternate years. (Academic year)

127–28 **20th-Century French Literature** (3–3)
Fiction, poetry, and drama from 1900 to present. Chronological examination of authors, movements. Offered in French, 1978–79 and alternate years; offered in English translation, 1979–80 and alternate years. (Academic year)

130 **From Cubism to Surrealism: Correspondences between Art and Literature** (3)
Expression of common preoccupations in diverse media. Readings, slides, lectures, and informal discussions. (Summer)

133 **Seminar: French Literature** (3) Staff
Topic to be announced in the *Schedules of Classes*. May be repeated for credit. (Summer)

151 **Cinema and Literature—in English** (3) Thibault
Interaction between the film and literature: aesthetic theories of the surrealists and their applications to the film and literary genres. Selected films and readings. May be repeated for credit. (Summer)

199–200 **Proseminar: Readings for the Major** (3–3) Staff
Required of all majors. Conferences and group discussions. (Academic year)

Third Group

202 **Thème et version** (3) Ludlow
Limited to students in the Graduate School of Arts and Sciences; open to others only by permission of the graduate advisor. Required of all graduate students in the field of French language and literature. Analysis and translation of selected prose passages, alternating between French and English; designed to teach students to write with precision and clarity. (Fall)

213–14 **Medieval French Literature** (3–3) Staff
French literature to the end of the Middle Ages. Prerequisite: a second-group course in French literature.

221 **Special Problems in 16th-Century French Literature** (3) Burks
May be repeated for credit.

226 **16th- and 17th-Century Philosophical Literature** (3) Burks
The emergence of a literature of ideas: emphasis on the thought of Calvin, Montaigne, Descartes, and Pascal.

229–30 **Literary Renaissance in Europe** (3–3) Burks
Study of the developments in the poetry of Italy, France, and England. (Academic year)

231–32 **Theater in the 17th Century** (3–3) Burks
Survey of the development of theatrical arts and the drama. Research papers and reports.

234 **17th-Century Nondramatic Literature** (3) Ludlow
Development of the classical doctrine in prose. (Fall)

241 **The Rationalistic Current in the 18th Century** (3) Ludlow
The contribution of the *philosophes* to the intellectual evolution of France and Europe.

242 **Seminar: the French Novel and Theater in the 18th Century** (3) Ludlow
Major 18th-century French novelists and dramatists and a comparison of their work with that of some English and German writers of the period. Readings in English and French. (Spring)

244 **Special Problems in 18th-Century French Literature** (3) Ludlow
May be repeated for credit.

253 **Special Problems in 19th-Century French Literature** (3) Frey
Topic for 1978: romanticism. May be repeated for credit. (Fall)

258 **Special Problems in 19th-Century French Poetry** (3) Frey

264 **Seminar: Modern Period** (3) Coffland
Topic for 1979: the 20th-century novel. May be repeated for credit
(Spring)

265 **20th-Century French Theater** (3) Coffland
Survey of the development of the theater from 1900 to the present

266 **20th-Century French Poetry** (3) Coffland
Background and development of poetry in the 20th century; explica
tion de texte approach.

295 **Independent Reading and Research in French Literature** (arr.) Staff
For students preparing for the Master of Arts degree. May be re
peated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

Fourth Group

George Washington University is a member of the Folger Institute of Renais
sance and 18th-century Studies. Institute policies are set by a central com
mittee on which each member institution is represented. Doctoral students
enrolled in one of the Institute seminars are eligible to apply for fellowship
aid. Folger Institute Seminars are numbered 301 through 308. Students wishing
to register for these courses should consult the chairman of the Department
of Romance Languages and Literatures.

301–308 **Folger Institute Seminar** (3 each) Staff
Topics will be announced.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general
examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for
credit. (Fall and spring)

ITALIAN

First Group

1–2 **First-year Italian** (3–3) Coffland and Staff
A year course; credit toward a degree at this University given on
completion of Ital 2. For beginners. Pronunciation, conversation,
grammar, composition, readings. Oral practice in language laboratory.
Laboratory fee, $17.50 per semester. (Academic year)

3–4 **Second-year Italian** (3–3) Coffland and Staff

A year course; credit toward a degree at this University given on completion of Ital 4. Conversation, grammar review, composition, reading of modern Italian prose, introduction to Italian civilization. Oral practice in language laboratory. Prerequisite: Ital 1–2. Laboratory fee, $17.50 per semester. (Academic year)

9–10 **Italian Conversation and Composition** (3–3) Coffland

Prerequisite: Ital 4 or equivalent and permission of instructor. (Academic year)

11 **Italian through Opera** (3) Chambers

Conversational Italian presented through excerpts from operas and their libretti. Pronunciation and grammatical principles, vocabulary, and conversation. (Summer)

Third Group

295 **Independent Reading and Research in Italian Literature** (arr.)

For students preparing for the Master of Arts or Doctor of Philosophy degree. May be repeated for credit. (Fall and spring)

PORTUGUESE

First Group

31–32 **Intensive Portuguese** (3–3) Robb

Prerequisite: knowledge of one other Romance language. (Academic year)

SPANISH

Departmental prerequisite: Span 3–4 or 6, or equivalent, is prerequisite to all second-group courses in Spanish, except for courses offered in English translation.

First Group

1–2 **First-year Spanish** (3–3) Hicks and Staff

A year course; credit toward a degree at this University given on completion of Span 2. For beginners. Pronunciation, conversation, grammar, composition, readings. Oral practice in language laboratory. Laboratory fee, $17.50 per semester. (Fall and spring)

3–4 **Second-year Spanish** (3–4) Hicks and Staff

A year course; credit toward a degree at this University given on completion of Span 4. Conversation, grammar review, composition, reading of modern Spanish prose. Oral practice in language laboratory. Prerequisite: Span 1–2. Laboratory fee, $17.50 per semester. (Fall and spring)

6 **Second-year Spanish** (6) Hicks and Staff

Lecture (3 hours), discussion (3 hours). Intensive course which covers

material of Span 3–4. Prerequisite: grade of B or better in Span 2. Laboratory fee, $17.50. (Fall and spring)

9–10 **Spanish Conversation and Composition** (3–3) Azar and Staff
Conversation, composition, vocabulary, and syntax. Prerequisite: Span 4 or equivalent. (Fall and spring)

20 **Prensa y Cultura: Intensive Spanish Conversation** (3) Staff
Intensive conversation organized around specific contemporary topics; illustrated by periodical material, films and interviews. (Summer)

49 **Spanish for Graduate Students** (0) Hicks
For graduate students preparing for reading examinations. No academic credit. Tuition is charged at the rate of three credit hours, plus University Center fee. (Fall and spring)

51–52 **Survey of Spanish Literature and Civilization** (3–3) Barnett
Social, artistic, and cultural background of Spanish literature. Lectures, readings, recitations, and informal discussions. (Academic year)

91–92 **Explicación de Textos** (3–3) Sáenz
Analytical introduction to Spanish and Spanish-American literature. Method demonstrated and practiced on selected passages. (Academic year)

Second Group

109–10 **Advanced Spanish Conversation and Composition** (3–3) Mazzeo
Development of writing and speaking skills. Emphasis on diction and style. Prerequisite: Span 10 or equivalent. (Academic year)

119–20 **Medieval Spanish Literature** (3–3) Staff
Survey by genre of the literature of the Middle Ages. (Academic year)

121–22 **Spanish Literature of the Golden Age** (3–3) Azar
Span 121: poetry and theater; Span 122: prose.

123–24 **Cervantes: Don Quijote** (3–3) Azar
The *Quijote* and the novel as a literary genre: reality and fiction. (Academic year)

125–26 **Modern Spanish Literature** (3–3) Mazzeo
Prose, poetry, and drama of the 18th and 19th centuries. Class analysis of texts, collateral readings, lectures on literature and history. (Academic year)

127–28 **Contemporary Spanish Literature** (3–3) Sáenz
Prose, poetry, and drama of the 20th century. Class analysis of texts, collateral readings, lectures on literature and history.

130 **The Modern Spanish Essay** (3) Mazzeo
Development of the Spanish essay from the 16th through the 20th centuries; emphasis on the 18th and 19th centuries. Class analysis of texts, collateral readings, and lectures.

133 **Feminist Authors in Hispanic Literature** (3) Mazzeo
Development of feminist themes in Hispanic literature. Class analysis of representative works with readings in Spanish or in English translation. (Summer)

137 **The Spanish Civil War and the Creative Artist** (3) Barnett
Historical and literary study of the Spanish Civil War and the subsequent artistic reaction in Spain, Great Britain, France and the U. S. Taught in English with readings in Spanish or English. (Summer)

141 **New Spanish-American Narrative** (3) Robb
Short stories of Borges, Cortázar, Fuentes, Arreola, Carpentier, García Márquez. (Summer)

143 **Latin America: A Literary-Cultural View** (3) Robb
Contemporary Latin America: its culture and society as seen through its writers. (Summer)

151–52 **The Spanish-American Novel** (3–3) Robb
Development of the novel in Spanish America. Lectures, collateral readings, and class analysis of texts.

155–56 **Spanish-American Literature to 1880** (3–3) Robb
Literature of Spanish America from the colonial period to the latter part of the 19th century. Lectures, collateral readings, reports, and class analysis of important works. (Academic year)

157–58 **Spanish-American Literature since 1880** (3–3) Robb
Literature of Spanish America from 1880 to the contemporary period. Lectures, collateral readings, reports, and class analysis of important works.

199–200 **Proseminar: Readings for the Major in Hispanic Language and Literatures** (3–3) Barnett
Required of all majors. Conferences and group discussions. (Academic year)

Third Group

215 **Seminar: Medieval Literature** (3) Staff

221 **Seminar: Cervantes' "Don Quijote"** (3) Azar
Cervantes' literary theories, the *Quijote* and its relations with the other *novelas cervantinas* as different modes of representing reality in literary fiction. (Fall)

224 **Seminar: "La Celestina"** (3) Azar
(Formerly Seminar: Special Problems in Spanish Renaissance Literature)
(Spring)

225 **Seminar: Special Problems in Golden-Age Literature** (3) Azar
May be repeated for credit.

231 **Seminar: 18th-Century Spanish Writers** (3) Mazzeo
Lectures and analysis of principal authors and works; relationships with subsequent literary movements.

242 **Seminar: Spanish Romanticism** (3) Mazzeo
Lectures and analysis of principal authors and works. Collateral readings. Problems of origins and development.

244 **Seminar: Naturalism and the Spanish Novel** (3) Mazzeo
Development of Naturalism in 19th-century Spain. Analysis of representative works of Pardo Bazán, Clarín, Blasco-Ibáñez and others. (Fall)

246 **Seminar: Works of Galdós** (3) Barnet
Ideological and stylistic analysis: relationship of Galdós' works to literary movements of the second half of the 19th century. (Fall

248 **Seminar: Spanish Lyric Poetry of the 20th Century** (3) Sáenz
Stylistic analysis of the most significant poets from 1898 to the present. (Spring)

250 **Seminar: Novecentismo y Literatura de Entreguerras** (3) Sáenz
The prose writers: intellectualism and new forms of expression.

251 **Seminar: Works of Unamuno and Ortega y Gasset** (3) Sáenz
Study of the thought of Unamuno and Ortega y Gasset; analysis and commentary on the texts.

252 **Spanish Literature since the Civil War** (3) Sáenz
Development of the Spanish novel since 1939. (Fall)

253 **Seminar: Studies in Modern Spanish-American Poetry** (3) Robb
Poetic trends studied in selected poets and groups of poets from the Modernists through Post-modernists and Vanguardists to the present

255 **Seminar: Studies in 20th-Century Spanish-American Theater** (3) Robb
Trends in modern theater with emphasis on Mexico, Central America, Puerto Rico, Chile, and the Río de la Plata area.

256 **Seminar: Studies in Mexican Narrative Prose** (3) Robb
Study of the emergence and development of the "New Mexican Narrative" through the works of Yáñez, Rulfo, Arreola, Fuentes, Leñero, and others. (Fall)

261 **Seminar: Studies in the Spanish-American Short Story and Essay** (3) Robb
The Spanish-American short story and essay as artistic forms; selected modern short story writers and essayists.

264 **Seminar: Studies in Recent Spanish-American Fiction** (3) Robb
The "New Spanish-American Narrative" studied in the novels and short stories of Borges, Bioy Casares, Cortázar, Vargas Llosa, García Márquez, Carpentier, Cabrera Infante, and others. (Spring)

266 **Seminar: Alfonso Reyes: Essayist, Poet, Narrator** (3) Robb
Alfonso Reyes—essayist, poet, narrator and complete literary humanist—studied in his various prose and poetic works.

287 **Seminar: Problems in Latin-American Civilization** (3) Staff
Interdisciplinary seminar partially guided by a specialist within

methodology of his chosen discipline; each student writes a report on some aspect of a selected key theme. Admission by permission of instructor. (Spring)

295 **Independent Reading and Research in Spanish and Spanish-American Literature** (arr.) Staff

For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) **Staff**

(Fall and spring)

Fourth Group

398 **Advanced Reading and Research** (arr.) **Staff**

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

SANSKRIT

See **Germanic Languages and Literatures.**

SCANDINAVIAN

See **Germanic Languages and Literatures.**

SERBO-CROATIAN

See **Slavic Languages and Literatures.**

SERVICE-LEARNING PROGRAM*

Neil Seldman, *Coordinator*
Associate *Professor* S. Greene
Assistant *Professors* H. Nashman, N.C. Garner
Instructor D.J. Lynn
Adjunct *Instructor* P.E. Wallace, Jr.

151 **Urban Legal Services** (6) **Wallace**

Field work and academic study of the urban legal system. Role of urban legal system in promoting humanistic values and enhancing social change. Admission by permission of instructor. (Fall and spring)

* Administered by the Division of Experimental Programs.

152 **Human Resource Issues in Education** (6) Nashman

Exploration of the effects of education on society and vice versa opportunities for experience, study and service in public, private, museum, hospital and community education centers. Admission by permission of instructor. (Fall and spring)

153 **Issues in American Health Care** (6) Lynn*

Field work combined with academic study of present American health care system and its problems: cost, quality of care, delivery of health care, ethical issues, health education, consumer issues, etc. Field placements (12–20 hours a week) in appropriate health-related activities. Admission by permission of instructor. (Fall and spring

154 **Independent Study** (3 or 6) Seldman

Field work combined with academic study, involving field-placements (15-20 hours a week) and complementary academic program of study, under the supervision of an appropriate faculty member. Students must "contract" with the agency, the faculty member and the Service-Learning Program. Admission by permission of instructor. (Fall and spring)

155 **The Arts and their Audiences** (6) Garner

Studies in the purpose and operation of the arts organizations in Washington. Weekly seminars and placement in an internship in an arts organization. Discussion topics focus on the process of communication between artists and the public, the government and the business community. Open to students with a demonstrated interest in the arts and the maturity to perform in a responsible position in an arts organization. (Spring)

156 **Community Planning and Development** (6) Greene

Field work combined with academic study of the role of urban and regional planning in analyzing and responding to the needs of an urban society. Field placements (12–20 hours per week) in a public agency or in the private sector. Admission by permission of instructor. (Fall and spring)

SINO-SOVIET STUDIES

See **Institute for Sino-Soviet Studies.**

SLAVIC LANGUAGES AND LITERATURES

Professors H.B. Yakobson, C.A. Moser
Associate Professors N.N. Natov, G.A. Olkhovsky *(Chairman)*, W.W. Rowe, I. Thompson
Adjunct Assistant Professor M.F. Miller
Assistant Professorial Lecturer S. Ficks

Bachelor of Arts with a major in Russian language and literature (field-of-study or departmental)—The following requirements must be fulfilled.

1. The general requirements as stated on pages 74–75, 80–87.

* Dorcas Joanne Lynn is Clinical Instructor in Medicine at the G. W. U. School of Medicine and Health Sciences.

2. Prerequisite courses—Slav 5–6 (preferred), or Slav 1–2, 3–4; or equivalent; and Slav 91–92.

3. Required for the major:

Field-of-study major—By the end of the senior year the student will be expected to have a reasonable command of language skills and a grasp of the fundamentals of Russian structure, as well as a good foundation in Russian literature and culture. The passing of a major examination during the senior year is required. The department provides a proseminar to assist the student in preparation for the major examination.

Departmental major—from 30 to 36 semester hours of course work in the Department of Slavic Languages and Literatures distributed as follows: Language—12 to 15 hours chosen from Slav 9–10, 101, 103, 104, 109–10, 198; Culture and Civilization—six hours chosen from Slav 71, 161–62, 172; Literature in Russian—six hours chosen from Slav 141–42, 151–52; Literature in English Translation—six to nine hours chosen from second-group courses.

A student who is already proficient in Russian language or literature may, upon passing an appropriate examination, waive any or all of the first-group language or literature courses, as well as up to six semester hours of second-group courses.

Bachelor of Arts with a major in Russian literature and culture—in translation (field-of-study)—The following requirements must be fulfilled.

1. The general requirements as stated on pages 74–75, 80–87.

2. Prerequisite courses—Slav 47 and 49, or Slav 1–2 and 3–4, or equivalent; and Slav 91–92.

3. By the end of the senior year the student will be expected to have a good grasp of Russian literature and the principles of literary criticism, as well as a general knowledge of Russian culture and history. The passing of a major examination during the senior year is required. The department provides a proseminar to assist the student in preparation for the major examination.

A student who is already proficient in Russian language or literature may, upon passing an appropriate examination, waive any or all of the first-group language or literature courses, as well as up to six semester hours of second-group courses.

Master of Arts in the field of Russian language and literature—Two areas of concentration are offered: Russian language and literature, and Russian language and linguistics.

Prerequisite: the degree of Bachelor of Arts with a major in Russian language and literature or Russian literature and culture—in translation from this University, or an equivalent degree. A student planning a concentration in Russian language and literature must have a general proficiency in the Russian language, a general knowledge of Russian literature and an acquaintance with Russian history and culture. A student planning a concentration in Russian language and linguistics must have a general proficiency in the Russian language, a general knowledge of its structure, and an acquaintance with general linguistics.

Required: the general requirements, pages 90–98. The program of study consists of 24 semester hours of approved course work plus a thesis (equivalent to six semester hours) or 30 semester hours of approved course work without a thesis. Candidates electing the Russian language and literature concentration must include six semester hours of linguistics and at least 18 hours of literature; candidates electing the Russian language and linguistics concentration must include six semester hours of literature and at least 18 hours of language and linguistics. All candidates must pass a reading knowledge examination in either French or German and must pass a Master's Comprehensive Examination.

Bachelor of Arts in Education with a teaching field in Russian—Prerequisite: the education curriculum, pages 113–14.
Required: the Russian option and the professional courses listed on page 117.

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

First Group

1–2 First-year Russian (3–3) **Yakobson and Staff**
Beginners' course in fundamentals of grammar and pronunciation. Slav 1 is prerequisite to Slav 2. Laboratory fee, $17.50 per semester. (Fall and spring)

3–4 Second-year Russian (3–3) **Yakobson and Staff**
Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 per semester. (Academic year)

5–6 Intensive Beginning Russian (6–6) **Thompson and Staff**
Classroom (7 hours), laboratory (1 hour). Beginners' intensive course in the fundamentals of Russian. Prerequisite to Slav 6: Slav 2 or 5. Laboratory fee, $17.50 per semester. (Academic year)

9–10 Intermediate Russian Conversation and Composition (3–3) **Yakobson**
Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor. (Academic year)

31–32 Elementary Polish (3–3) **Staff**
Beginners' course in the fundamentals of grammar and pronunciation. Prerequisite to Slav 32: Slav 31 or equivalent. Laboratory fee, $17.50 per semester. Offered if enrollment is sufficient.

41–42 Elementary Serbo-Croatian (3–3) **Staff**
Beginners' course in the fundamentals of grammar and pronunciation. Prerequisite to Slav 42: Slav 41 or equivalent. Laboratory fee, $17.50 per semester. Offered if enrollment is sufficient.

47 Beginning Russian for Reading (3) **Mille**
For undergraduate and graduate students with little or no Russian who wish to acquire a reading knowledge of the language. No academic credit for graduate students. (Fall)

49 Russian Reading (3) **Mille**
Primarily for graduate students preparing for reading examinations. No academic credit for graduate students. Prerequisite: Slav 47 or equivalent. (Spring)

51–52 Elementary Bulgarian (3–3) **Mosc**
Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 52: Slav 51 or equivalent. Laboratory fee, $17.50 per semester. Offered if enrollment is sufficient.

71 **Introduction to Russian Civilization** (3) Olkhovsky

Survey of Russia's artistic, social, and cultural development. Lectures, discussion, visual aids—in English. (Fall)

91–92 **Introduction to Russian Literature** (3–3) Moser

Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English. (Academic year)

Second Group

101 **Readings in the Soviet Press** (3) Staff

Representative reading and translation of Soviet periodicals and current publications in social sciences. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Fall)

103 **Scientific Russian** (3) Staff

Representative readings in the major fields of Russian contemporary scientific literature. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Spring, even years)

104 **Business Russian** (3) Staff

Study of Russian business vocabulary and concepts of business in the Soviet context. Prerequisite: Slav 4, 6, 49, or permission of instructor. (Spring, odd years)

109–10 **Advanced Russian Conversation and Composition** (3–3) Yakobson

Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent. (Academic year)

128 **Dostoevsky, the Man and the Artist** (3) Natov

Sources and development of Dostoevsky's philosophical, religious, and aesthetic ideas. His influence on Russian and Western literature. Lectures, discussions, and reports—in English. (Fall)

141–42 **19th-Century Russian Literature** (3–3) Staff

Major Russian writers and literary trends from the end of the 18th century to Chekhov; fiction, poetry, drama—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Academic year 1978–79 and alternate years)

143–44 **The Russian Novel** (3–3) Moser

Study of representative novels of the 19th and 20th centuries—in English. (Academic year 1978–79 and alternate years)

146 **The Russian Short Story** (3) Natov

Historical development of the Russian short story. Lectures, reports, and class analysis—in Russian. (Spring, odd years)

151–52 **20th-Century Russian Literature** (3–3) Natov

Various trends in Russian literature since the beginning of the 20th century. Masterpieces of Russian poetry, prose, and drama—in Russian. Prerequisite: Slav 4 or 6, or equivalent. (Academic year 1979–80 and alternate years)

156 **Leo Tolstoy, His Life and Works** (3) Rowe

Evolution of Tolstoy's artistic and philosophical ideas. Tolstoy's

impact on Russian literature and society. Lectures, reports, and classroom analysis of his major works—in English. (Spring)

157 **Nabokov** (3) Rowe
Reading and discussion of the major creative works. Russian roots, ordering of reality, sexual symbolism—in English. (Fall)

158 **Solzhenitsyn** (3) Staff
Reading and discussion of the most important stories, novels, and plays by the outstanding contemporary Russian writer—in English. (Spring, even years)

161–62 **Russian Culture** (3–3) Olkhovsky
Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lectures, discussion, reports. (Academic year)

165 **Soviet Literature from the Revolution to World War II** (3) Natov
Basic themes, issues, literary figures of the Soviet 1920s. The fate of literature and writers under increasing state control; Five-year Plan literature. Lectures, discussion, reports—in English. (Fall)

166 **Soviet Literature from World War II to the Present** (3) Natov
Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberal and "underground" literature. Lectures, discussion, reports—in English. (Spring)

172 **Soviet Dissent** (3) Olkhovsky
Examination of artistic and intellectual dissent since the death of Stalin; underground press, songs, plastic arts—in English. (Spring)

178 **Women in Russian Literature** (3) Staff
The unique role of women in Russian literature. Reading and discussion of major works by Russian women writers—in English. (Spring, even years)

191 **Russian Literature to 1800** (3) Moser
Survey of Russian literature from the earliest times to the end of the 18th century—in English.

193–94 **The Other Slavs: Their Literature** (3–3) Moser
Taught in English. An examination of non-Russian Slavic literatures from their beginnings to the present day. Emphasis on themes, ideas, and styles peculiar to each literature.

195 **Special Problems in Russian** (3) Staff
Detailed study of more difficult characteristics of the Russian language: verbal aspects, the case-preposition system, intonation, semantics, and syntax.

197 **Methodology of Teaching Russian** (3) Thompson
Discussion of methods, examination of textbooks, observation of classroom procedures. Prerequisite: 18 semester hours of Russian language. (Fall, even years)

198 **Russian Stylistics** (3) **Natov**
Development of the Russian language, literary styles, and techniques: words and their aesthetic value, phraseological units, word order, phrase structure. (Spring, odd years)

199–200 **Proseminar: Readings for the Major** (3–3) **Staff**
Conferences and group discussions. (Academic year)

Third Group

213 **Russian Linguistic Structure I: Phonology and Morphology** (3) **Thompson**
Linguistic description of the phonology and morphology of standard contemporary Russian. (Fall)

214 **Russian Linguistic Structure II: Syntax, Lexicon, and Semantics** (3) Thompson
Linguistic description of the syntax, lexicon, and semantics of standard contemporary Russian. (Spring)

215 **History of the Russian Language** (3) **Thompson**
Historical phonology, morphology, and syntax of the Russian language. (Fall, odd years)

216 **Comparative Slavic Structure** (3) **Thompson**
Study of the structure of Slavic languages other than Russian. Knowledge of a Slavic language other than Russian is helpful, but not required. (Spring, even years)

225 **Pushkin and the Poets of his Time** (3) Natov
Pushkin's predecessors; Pushkin's lyrics and dramas. Lermontov—the heir to Pushkin's poetic tradition. (Fall, odd years)

253 **Seminar: Literary Criticism** (3) **Natov**
Study of leading Russian critics and their role in the development of Russian literature; the emergence of various literary schools. (Spring, even years)

254 **Seminar: Literary and Intellectual Currents of the 1860s** (3) **Moser**
Discussion of literary and intellectual developments in the Russia of the 1860s. Reading knowledge of Russian required. (Spring, odd years)

255 **Seminar: Main Trends in 20th-Century Russian Literature** (3) Natov
Study of representative works since 1900: their artistic and social value—in Russian. (Fall, even years)

295 **Independent Reading and Research** (arr.) **Staff**
For students preparing for the Master of Arts degree. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

SOCIOLOGY

Professors R.W. Stephens, I.H. Cisin, R.G. Brown, T.F. Courtless, Jr. *(Chairman)*, P.H.M. Lengermann, R.A. Wallace
Associate Professors J. Helmer, P.L. Stewart
Assistant Professors J.L. Tropea, M.E. Boeckmann

Bachelor of Arts with a major in sociology (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students must consult the departmental advisor regarding course to be taken in satisfying the requirement for meaningful initiation into the Humanities and the Natural and Mathematical Sciences.)
2. Prerequisite course—Soc 1.
3. Required courses in related areas—12 semester hours in one of the following related social science fields; anthropology, economics, geography, history, political science, or psychology.
4. Required courses in the major—Soc 101, 140–41, 149; 15 additional semester hours in second-group sociology courses.

Master of Arts in the field of sociology—Prerequisite: a bachelor's degree with a major in sociology or in an approved related field. Applicants should present scores on the Graduate Record Examination, especially in the Verbal and the Quantitative Tests, and arrange for former professors to write letters of reference to the Graduate School of Arts and Sciences.

Required: the general requirements, pages 90–98. With the approval of the advisor and of the Graduate Education Committee, students may elect one of the following programs: (1) at least 24 semester hours of graduate work plus a thesis (equivalent to six semester hours), satisfactory completion of a Master's Comprehensive Examination in sociological theory and social research methods and an oral defense of the thesis; or (2) at least 33 semester hours of graduate course work and satisfactory completion of a Master's Comprehensive Examination in sociological theory, social research methods, and one substantive special field (deviant behavior, political sociology, sociology of work, urban sociology, or sociology and social policy). Fifteen semester-hours of elective courses must be interrelated in a logical way to form a subspecialization, and may be taken outside of the department.

In addition to the hours specified above, all candidates must satisfactorily complete Stat 105 or its equivalent. All candidates must select from the graduate sociology courses as follows: six hours chosen from sociological theory (Soc 238 and 239 recommended), six hours chosen from social research methods, and six hours chosen from one special area (deviant behavior, political sociology, sociology of work, urban sociology, or sociology and social policy). Candidates must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language or by satisfactorily completing the tool requirement in either statistics or computer programming.

Doctor of Philosophy in the field of sociology—Required: the general requirements, pages 90–92, 98–100. Students must complete from 30 to 36 semester hours of graduate course work, and from 12 to 18 semester hours of dissertation research, for a total of 48 hours beyond the master's degree. Students must include in their program of study graduate course work in each of the following: six semester hours of sociological theory (including Soc 338), six hours of social research methods and six hours each in two substantive specialties, at least one of which must be chosen from among those offered by the Department of Sociology—deviant behavior, political sociology, sociology of work, sociology and social policy, and urban sociology. Students must satis-

factorily complete the General Examination in sociological theory, social research methods, and two substantive specialties. Students must also fulfill the tool requirement by passing a reading knowledge examination in one foreign language and by satisfactorily completing the tool requirement in either statistics or computer programming.

Departmental prerequisite: Soc 1 is prerequisite to all courses in Sociology except for Soc 181 and 191.

First Group

1 Introductory Sociology (3) — Staff

General principles of sociology; development of culture and personality, impact of groups and institutions on man's social behavior. (Fall and spring)

2 Major Social Issues (1, 2, or 3) — Staff

(Formerly 3 credits)

Critical examination of three selected social issues in a modular format. Each issue will be offered in a module of about 4½ weeks. Students may register for one, two, or three modules, for a corresponding number of credits. Issues change each semester.

Second Group

101 Development of Social Thought (3) — Lengermann, Stephens

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century. Prerequisite: Soc 1. (Fall and spring)

124 Medical Sociology (3) — Brown, Stewart

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services. (Fall)

125 Sociology of Religion (3) — Wallace, Yeide

Introduction to history of the religious area of sociology; analysis of reciprocal impact of secular upon religious and religious upon secular institutions. (Fall)

126 Urban Sociology (3) — Helmer

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development. (Fall)

127 Population Problems (3) — Stewart

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control. (Fall)

128 Urban Problems and Policies (3) — Helmer

Seminar on urban problems and the policies developed in response to them; special focus on Washington, D.C.; students placed in Washington agencies; seminar sessions devoted to social-policy analyses of the students' experiences. (Spring)

129 Race and Minority Groups (3) Tropea

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice. (Spring)

130 Class, Status, and Power (3) Stephens

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparisons; analysis of public policies which affect these distributions. (Fall)

132 Political Sociology (3) Helmer, Lengermann

Analysis of problems involved in the study of power relations in society: distribution of power in society; types and processes of government; political participation and political mobilization. (Fall)

133 Sociology of Education (3) Wallace, Tropea

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components. (Spring)

135 Juvenile Delinquency (3) Courtless, Tropea

Factors producing delinquency; juvenile detention, the juvenile court, training schools, treatment of offenders. (Spring)

136 Criminology (3) Courtless, Tropea

Nature and distribution of crime as related to the development and operation of criminal law and various social and legal institutions in urban society. (Fall)

137 Sociology of Law (3) Courtless

Law as a social phenomenon and agency of social control. Problems of legal concepts, doctrines, and institutions. (Fall)

139 Society and the Deviant (3) Tropea

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools. (Spring)

140–41 Social Research Methods (3–3) Boeckmann, Cisin

Soc 140: introduction to basic research methods in sociology. Soc 141: advanced research methods. Prerequisite to Soc 141: Soc 140. (Soc 140 and 141—fall and spring)

143 Social Movements (3) Stephens

General survey of the various forms of collective behavior (fads, panics, riots, social movements, etc.), and a more detailed study of the genesis, development, and decay of social movements and social revolutions. (Spring)

144 Public Opinion and Mass Communication (3) Cisin

Communication process with emphasis on international communications, propaganda, and mass media; measurement of propaganda campaigns. (Fall)

149 Modern Sociological Theory (3) — **Wallace, Lengermann**

Systematic study of contemporary schools of sociological theory, both European and American; evaluation of scientific contributions of each school. Prerequisite: Soc 101. (Fall and spring)

151 Problems of Urban Social Systems (9) — **Staff**

Developing a comprehensive perspective on selected social problems through lectures and readings. Topic changes each semester. Prerequisite: 24 semester hours selected from economics, history, political science, psychology, and sociology. Admission by permission of instructor. Concurrent registration in Soc 152 required. (Fall)

152 Problems of Urban Social Systems—Supervised Field Work (6) — **Staff**

Accompanies Soc 151. A maximum of 24 hours a week will be spent in service-research efforts by placement in the Washington, D.C., area. Concurrent registration in Soc 151 required. (Fall)

*__153 Poverty in America__ (3) — Boeckmann, Yezer

Exploration of social and economic causes of poverty in the United States and evaluation of anti-poverty strategies, including comprehensive welfare reform. Discussion of conflicts between sociological and economic models of behavior of low income groups.

155 Women, Sex Roles, and Socialization (3) — **Wallace**

Analysis of the social-structural and personality theories and empirical research on sex role socialization in contemporary society. Topics include sexual inequality, women's changing place in the occupational structure, and social change and the women's movement. (Fall)

160 Death and Dying: A Sociological Perspective (3) — Staff

Processes of death and dying examined from cross-cultural and national perspectives. Topics include considerations of terminal care, abortion, murder, funeral customs, genocide, and the depiction of death in literature and philosophy. (Spring)

181 Major Social Processes (3) — **Staff**

Analysis and examination of various processes in society of general importance to the field of sociology, e.g., social conflict, socialization, social change, etc. Topic changes each semester; may be repeated for credit. Admission by permission of instructor. (Fall and spring)

191 Current Emphases in Sociology (3) — **Staff**

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit. Admission by permission of instructor. (Fall and spring)

195 Research (1, 2, or 3) — **Staff**

(Formerly three credits)

Independent study and special projects. Open only to selected undergraduate students with promising academic records. Before students are permitted to register for Soc 195, they must submit a written pro-

* Interdepartmental course offered by the Departments of Sociology and Economics.

posal of their plan of study for the approval of the staff member of the department who will be directing their research. (Fall and spring)

Third Group

203 **Social Organization** (3) Wallace, Brown
Introduction to sociological concepts and perspectives on society as a system of institutions. Recommended for students offering sociology as a supporting field. (Fall)

210 **Theoretical Foundations of Political Sociology** (3) Lengermann
Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change. (Fall)

212 **Seminar: Political Processes** (3) Lengermann, Boeckmann
Sociological studies of political process in the United States; distributions of power; political socialization, attitudes, participation, communication; social movements. Prerequisite: Soc 210. (Spring)

220 **Religious Institutions in Urban America** (3) Wallace, Yeide
Structural variety of religious institutions and patterns of interaction between religious and secular institutions in contemporary urban life. (Spring, even years)

223 **Urban Sociology** (3) Helmer
Sociological perspectives on urbanization and urbanism and on the determinants of the forms and structure of the city. (Fall)

224 **Urban Life** (3) Helmer
Examination of differentiation—social, cultural, areal; life styles, territorial groupings, community participation. Prerequisite: Soc 223. (Spring)

230 **Sociological Research Methods** (3) Boeckmann, Cisin
Systematic survey of sociological research strategies and review of the literature in this area. Recommended for students with only one undergraduate course in research techniques. Prerequisite: Soc 141 or equivalent. (Fall)

231 **Seminar: Advanced Research Methods** (3) Boeckmann, Cisin
Intensive study and evaluation of a few sophisticated research techniques and of new developments in the methodology of social research. Prerequisite: Soc 230 or equivalent. (Spring)

232 **Seminar: Research Planning and Execution** (3) Cisin, Boeckmann
Clinical review of student research projects; recommended for students engaged in thesis and dissertation research. Prerequisite: Soc 230 or equivalent. (Spring)

235 **Seminar: Sociology of Education** (3) Wallace
Sociological theories on relationships between education and the economic, political, social, and cultural character of society; examination of social factors relating to such topics as educational achievement, the changing functions of educational structures, and the roles of teacher and student. (Spring, odd years)

238 **Seminar: Development of Sociological Theory** (3) Lengermann

Development of sociology from the early 1800s to the 1920s. Intensive analysis of the classical theoretical statements. (Fall)

239 **Seminar: Modern Sociological Theory** (3) Lengermann, Wallace

Intensive examination and evaluation of contemporary schools of sociological theory in Europe and America. Advanced analysis of theoretical perspectives. Prerequisite: Soc 238. (Spring)

240 **Sociology of Work and Occupations** (3) Stewart, Brown

Analysis of occupational roles and structures; recruitment and training; adjustment problems at various career stages; interrelationships of stratification, life styles, and work roles. (Fall)

241 **Sociology of Work and Organizations** (3) Stewart

Theory of complex organizations relative to work in industry, government, and business: examination of basic processes such as decision-making, recruitment, allocation of authority, informal organization, and interorganizational relations. (Spring)

242 **Seminar: Urban Medical Systems** (3) Brown, Stewart

Sociological analysis of various problems in urban medical systems, e.g., delivery of health care services, interprofessional relationships, community health care, etc. (Spring)

252 **Seminar: Sociology and Social Policy** (3) Boeckmann, Helmer

Concepts, theory and research which demonstrate the applicability of a sociological perspective (for example, views on social systems, roles, formal organization, power, stratification, decision-making, social values) on the policy process. (Fall)

254 **Seminar: Methods in Social Policy Research** (3) Boeckmann, Helmer

Systematic survey of conceptualization, design and practice of evaluation research of social experiments, and of simulation and technological forecasting. Prerequisite: Stat 105, Soc 230, 252; or permission of instructor. (Spring)

*259 **Law and Criminology I: Search for the Causes of Criminal Behavior** (3) Courtless, Tropea

Same as Law 475(2). (Fall)

*261 **Law and Criminology II: Society's Responses to the Criminal Offender** (3) Courtless, Tropea

Same as Law 476(2). (Spring)

262 **Seminar: Police and the Community** (3) Courtless, Tropea

Analysis of contemporary urban law enforcement, including policing "styles," civil disorder, police-community relations, and competing perspectives on the place of police agencies in civil society. (Fall)

263 **Seminar: Law and Society** (3) Courtless

Selected problems in law as an instrument of social policy: emphasis on the organization of legal decision-making processes. (Summer)

* Students registering for Soc 259 or 261 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center Bulletin*

265 **Seminar: Criminal and Juvenile Justice Systems** (3) — Courtless, Tropea

Development of a systematic perspective on components and relationships constituting the juvenile and criminal justice systems. (Spring, even years)

*290 **Principles of Demography** (3) — Staff

Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. (Fall)

*291 **Methods of Demographic Analysis** (3) — Staff

Basic methods for analysis of mortality, natality, and migration; population estimates and projections; estimation of demographic measures from incomplete data. (Spring)

295 **Research** (arr.) — Staff

Independent study and special projects. Before permission is granted to register for Soc 295, the student must submit a written plan of study for the approval of the staff member of the department who will be directing the research. May be repeated once for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) — Staff

(Fall and spring)

Fourth Group

333 **Seminar: Theory Construction and Application** (3) — Tropea

Critical examination of the elements of current theories in the social sciences with the major objective of developing general principles of theory construction; consideration of the functions of theory in sociological research. (Fall)

351 **Selected Topics in Sociology** (3) — Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each fall semester: (1) *Social Research*—causal inference in social research, evaluation research, philosophy of science, etc.; (2) *Political Sociology*—comparative political structures, processes of policy formation, social movements, etc.; (3) *Sociology of Work*—work and public bureaucracies, industrial sociology, etc.

352 **Selected Topics in Sociology** (3) — Staff

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each spring semester: (1) *Sociological Theory*—study of important theorists such as Marx, Weber, Parsons; important themes such as social change, social control; important schools such as symbolic interactionism, general systems theory; (2) *Urban Sociology*—ecological processes, sub-urbanization, the urban school, race and ethnic relations, and related topics; (3) *Law and Society*—the sociology of law, theories of deviance, and related topics.

* An interdepartmental course offered by the Departments of Economics, Geography and Regional Science, Sociology, and Statistics

398 **Advanced Reading and Research** (arr.) **Staff**
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) **Staff**
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

SPANISH

See **Romance Languages and Literatures.**

SPECIAL EDUCATION

Professors P. Botwin *(Chairman)*, R.S. Cottrell, Jr., R.K. Ives
Associate Professor J.R. Shotel
Assistant Professors M.S. Castleberry, L.A. Tsantis, N.D. Tiscione, N.J.S. Sobel, R. Ianacone
Assistant Professorial Lecturer H. Novakovitch
Instructor M.B. Freund *(Research)*
Lecturers W.H. Eddy, J.L. Boyle

Programs of study in special education leading to the degrees of Bachelor of Arts in Education, Master of Arts in Education, and Doctor of Education are offered by the School of Education and Human Development (see pages 103–32).

Second Group

101 **Seminar: Dimensions of the Complementary Teaching Role** (3) **Staff**
Instructional experiences designed to refine the insights and competencies essential for successful operation of the complementary teaching model. (Fall)

102 **Teaching the Child with Special Needs: Methods and Materials** (3) **Staff**
Laboratory course taught in an elementary public school. Students observe and participate in a demonstration seminar conducted by the instructor. Must be taken concurrently with SpEd 189. (Fall)

103 **Teaching the Child with Special Needs: Creative Programming** (3) **Staff**
Continuation of SpEd 102. Concentration on the total programming of the child with special needs. Must be taken concurrently with SpEd 190. (Spring)

170 **Interpersonal/Intrapersonal Relationships for Special Education Teachers** (3) **Staff**
Consideration of factors leading to successful interaction with children. (Fall)

189 **Preprofessional Practicum: Observing the Special Child in the Regular Class Milieu** (3)
Supervised internship in school setting. Emphasis on intensive st of children with special needs. Must be taken concurrently w SpEd 102. (Fall)

190 **Preprofessional Practicum: Inspecting a Continuum of Special Education Services** (3)
Observation and participation in various special education settin Emphasis on exposure to and familiarity with goals and progra of various special education models. Must be taken concurren with SpEd 103. (Spring)

197–98 **Special Study in Special Education** (3–3)
Individual or group study or research under the guidance of s members. Program and conferences arranged with advisor. Admiss by permission of advisor. (Academic year)

199 **Practicum in Complementary Teaching** (6)
Supervised teaching internship in a school-based intervention p gram. Student teaching with children identified as needing spe education services. A minimum of 240 clock hours required. Adm sion by permission of the instructor. (Spring)

200 **Psychosocial Development of Young Exceptional Children** (3)
A course designed to illuminate the complex and interactive proces which exist in the relationship between psychosocial developm and the development process in general. (Fall)

Third Group

201 **Introduction to Special Education** (3)
Survey course to acquaint prospective teachers with special edu tion and to help them become aware of the various educationa modifications necessary to accomodate children in a school progra (Fall)

230 **Vocational Assessment of the Secondary Level Handicapped Student** (6)
Individual study of methods and materials used in vocational ass ment including formal and informal tests to determine vocatio interests and aptitudes, academic performance, learning style behavioral readiness. (Fall)

231 **Selected Vocational Methods and Materials** (3)
Selected materials and techniques used in teaching and programm for the secondary school level handicapped person in acade career, leisure, and occupational skill areas. (Fall)

232 **Practicum: Vocational/Special Education** (3)
Placement in at least three to five different sites offering progr in the areas of pre-vocational, industrial arts, and vocational gramming that serve the adolescent student. (Fall)

233 **Curriculum for Vocational/Special Education** (3)
Examples and practice in designing and implementing academic,

help, career education, pre-vocational, industrial arts, and vocational curriculum skills for the handicapped. (Fall)

234 **Seminar in Vocational/Special Education** (3) Ianacone
Weekly seminar dealing with experiences, problems, and concerns encountered during the internship with handicapped adolescents. Must be taken concurrently with Special Education 295. (Spring)

235 **Coordination of Job Placement Programs in Vocational/Special Education** (3) Eddy
Examples and programming considerations for the development and coordination of an adolescent job placement program. (Spring)

236 **Secondary Career Planning for the Handicapped** (3) Ianacone
(Formerly Postsecondary Career Planning for the Handicapped)
This course will address the on-going process of career decision making by the handicapped person who is completing a secondary school level program. (Summer)

260 **Developmental Assessment of Young Exceptional Children** (3) Shotel, Tsantis, Tiscione
Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor. (Fall)

261 **Practicum: Methods and Materials for Young Exceptional Children** (6) Ives, Tsantis, Castleberry, Shotel, Sobel
Clinical practice in design and implementation of educational strategies and materials. Three dimensions: designing and developing teaching materials, classroom teaching, feedback and evaluation with professor. Taught at a demonstration site. Requires eight hours a week in service. (Fall)

262 **Seminar: the Education of Young Exceptional Children** (3) Sobel, Tsantis, Tiscione, and Staff
Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with SpEd 292. Admission by permission of instructor. (Spring)

263 **The Severely and Profoundly Handicapped Child: Methods and Materials** (3) Freund
(Formerly Introduction to the Education of the Severely and Multiply Handicapped Child)
Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and field experience. (Fall)

264 **Advanced Study in the Special Education of Severely and Multiply Handicapped Children** (3) Tiscione
Specialized programs, techniques, and methods for teaching children with severe disabilities. (Spring, even years)

265 **Clinical Experience with Multiply Handicapped and Developmentally Disabled Young Children** (3) Ives
Preliminary field experience designed for students with no experience in early childhood special education. Supervised experience necessary for program articulation. Three-week intensive involvement in an early childhood special education setting. (Summer)

266 **The Development of Language in Young Exceptional Children** (3) Novakovitc

Introduction to the study of language acquisition and the applicatio of current research on language of handicapped children. (Fall)

267 **The Early Childhood Special Educator: A Survey of Roles and Services** (3) Tsantis, Freu

Examination of the spectrum of roles available in early childhoo special education; emphasis on role expectations and psychosoci dynamics of the various settings. (Spring)

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3) Sobel, Freu

Lecture (2 hours), site visitation (3 hours), discussion (1 hou (Fall)

269 **Multidisciplinary Theory in Special Education** (3) Ives, Tiscione, Castleber

Seminar involving student presentations focusing on sociological an psychological constructs relevant to interpersonal/intrapersonal re lationships. (Fall)

270 **Mainstreaming: Adapting Programs and Curriculum to Meet the Needs of the Special Child** (3) Staf

(Formerly Adapting the Early Childhood Curriculum to the Youn Exceptional Child)

Review of the basic curriculum areas as they relate to the develo ment of readiness skills in special education. (Spring, odd year

271 **The Interdisciplinary Approach to Planning for the Severely or Multiply Handicapped Child** (3) Freu

Laboratory experience in which students participate as educatio members of an interdisciplinary team. (Fall)

273 **Seminar for Special Education Strategist Intern** (3) Ives, Castleberry, Sta

Weekly seminar dealing with experiences, problems, and concern encountered during special education, early childhood strategist i ternship. Concurrent enrollment in SpEd 293 required. (Sprin

290 **Control and Management Techniques for the Young Exceptional Child** (3) Tiscio

Examination of the theory, techniques, and tools essential for gro control. Designed to provide practice as well as familiarity with t various theories of control of human behavior. Admission by p mission of instructor. (Fall)

292 **Professional Internship in Education of Young Exceptional Children** (6 or 9) Tiscione, Sobel, Freu

Supervised internship in the education of young exceptional ch dren. A minimum of 420 clock hours required. Must be taken co currently with SpEd 262. (Spring and summer)

293 **Professional Internship for the Special Education/Early Childhood Strategist** (9) Ives, Castlebe Sh

Supervised internship in strategist role, emphasizing divers

multi-dimensional aspects of a special education/early childhood program. A minimum of 420 clock-hours is required. Concurrent enrollment in SpEd 273 required. (Spring)

295 **Professional Internship in Vocational/Special Education** (9) — Ianacone and Staff

Supervised internship in the vocational/special education of adolescent handicapped youth, emphasizing the diversified, multi-dimensional, and inter-agency cooperative needs for such programming. A minimum of 420 clock hours is required. Must be taken concurrently with Special Education 234. (Spring)

297–98 **Individual Study in Special Education** (3–3) — Staff

Individual study or research under guidance of staff member. Program and conferences arranged with advisor. Admission by permission of advisor. (Academic year)

306 **Dynamics of Family Intervention: Theory and Practice in Special Education** (3) — Ives, Castleberry, Tsantis

Theoretical foundations and clinical techniques necessary for the early childhood special educator to successfully counsel parents of handicapped children. (Spring)

360 **Advanced Techniques in the Diagnostic-Assessment Process** (3) — Tiscione

Application of theoretical concepts of assessment; development of assessment programs; interpretation and application of interdisciplinary diagnostic evaluations. Prerequisite: SpEd 260 or equivalent. (Summer)

Fourth Group

401 **Doctoral Mini-Seminar in Special Education** (1) — Staff

Participation in a small group with a selected faculty member; intensive study and discussion of an area of common interest in an informal environment providing for the exchange of ideas and optimum potential for personal and professional growth. Admission by permission of instructor. (Fall)

453–54 **Doctoral Internship: Special Education** (6–6) — Staff

Supervised professional internship in college teaching, administration, supervision, or private agency function. Each internship individually arranged. Admission by permission of advisor. (Academic year)

490 **Departmental Seminar in Special Education** (3) — Shotel

Provides an opportunity for selected graduate students to develop, refine, and demonstrate their skills and abilities in a small-group setting with fellow students and department faculty. Admission by permission of instructor. (Spring)

491 **Dissertation Research** (arr.) — Staff

(Fall and spring)

SPEECH AND DRAMA

Professors J.W. Hillis *(Director of Speech Pathology and Audiology)*, L.S. Bowling *(Chairman)*, W.M. Reynolds *(Director of Speech Communication)*, L.S. Bielski
Professorial Lecturer G. Herer*
Associate Professors M.D.M. Brewer, J.R. Regnell, M.S. Kernan *(Visiting)*, C.W. Linebaugh
Associate Professorial Lecturer N. Striffler
Assistant Professors N.C. Garner *(Director of Theater)*, S. Keller *(Director of Forensics)*, B.W. Sabelli, J.E. Thiel, P.Z. Tauss, A.G. Wade, L.E. Jacobson
Instructor T.A. Farrand

Bachelor of Arts with a major in dramatic art (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the social studies and the natural and mathematical sciences.)
2. Prerequisite courses—SpDr 1, 11.
3. Required courses in related areas—24 semester hours of second-group courses outside the Department of Speech and Drama as approved by the major advisor. (Courses in dramatic literature offered in the classics, English, and foreign language departments are strongly recommended.)
4. Required courses in the major—SpDr 151, 152 or 195, 165–66; 12 additional semester hours in second-group drama courses.

Bachelor of Arts with a major in speech communication and broadcasting (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirement for meaningful initiation into the social studies and the natural and mathematical sciences.)
2. Prerequisite courses—SpDr 1, 11.
3. Required courses in related areas—12 semester hours in psychology and/or philosophy as approved by the major advisor; 18 semester hours in a single subject area outside the Department of Speech and Drama as approved by the major advisor.
4. Required courses in the major—SpDr 112, 121, 126; 15 additional semester hours of second-group courses in the Department of Speech and Drama as approved by the major advisor.

Bachelor of Arts with a major in speech pathology and audiology (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the social studies and the natural and mathematical sciences.)
2. Prerequisite courses—SpDr 1, 11.
3. Required courses in related areas—Psyc 115, 121 and 131 (or their equivalent), plus 15 additional semester hours of second-group courses selected for related areas as approved by the major advisor.

* Gilbert Richard Herer is also Professor of Child Health and Development in the University School of Medicine and Health Sciences.

4. Required courses in the major—SpDr 101, 103, 104, 106, 118, 119; six additional semester hours of courses in the Department of Speech and Drama as approved by the major advisor.

Master of Arts in the field of speech pathology and audiology—Prerequisite: the degree of Bachelor of Arts with a major in speech pathology and audiology from this University, or an equivalent degree, and an appropriate score on the Aptitude Test of the Graduate Record Examination.

Required: the general requirements, pages 90–98. The program of study consists of 36 semester hours of approved course work without a thesis, or with the approval of the department, 24 semester hours of approved course work plus a thesis (equivalent to six semester hours). All students must satisfy the academic and supervised practicum requirements of the Certificate of Clinical Competence awarded by the American Speech and Hearing Association.

All students must take the National Examination in Audiology or in Speech Pathology available through the Educational Testing Service. Students must request the Testing Service to send copies of the test scores to the department of speech and drama to be used in the fulfillment of the general requirement in the Graduate School of Arts and Sciences for the Master's Comprehensive Examination. Satisfactory test results must reach the department at least three weeks before graduation.

Master of Fine Arts in the field of dramatic art—Prerequisite: the degree of Bachelor of Arts from this University, or an equivalent degree.

Required: the general requirements, pages 90–98. The program of study consists of (1) 30 semester hours of second- and third-group course work planned in consultation with the advisor; (2) a creative thesis (equivalent to six additional semester hours) in the selected area of concentration. Each candidate is expected to complete the program in residence in four continuous academic-year semesters.

Bachelor of Arts in Education with a teaching field in speech and drama—Prerequisite: the education curriculum, pages 113–14.

Required: the speech and drama option and the professional courses listed on page 117.

Speech and Hearing Therapy: See Speech and Hearing Clinic, page 54.

First Group

1 Communicative Speaking and Listening (3) Reynolds and Staff

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $4. (Fall and spring)

2 Interpersonal Communication (3) Reynolds

Introduction to the role of verbal and nonverbal transactions in spontaneous, face-to-face encounters. Role-playing, models, and simulations. (Summer)

11 Voice and Diction (3) Bielski and Wade

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4. (Fall and spring)

32 **Interpretation of Literature** (3) Wack
(Formerly Oral Interpretation of Literature)
The study of literature through performance. Interpretation of prose, poetry, and drama. Recording fee, $4. (Fall and spring)

45 **Understanding the Theater** (3) Taus
The art of the theater; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through lectures and class discussion. Attendance at theatrical performances and presentations by visiting artists. Primarily for nonmajors. (Fall and spring)

49 **Rhetoric in Political and Social Action** (3) Kelle
Study of the use and abuse of rhetoric in contemporary political and social movements. Influence of speech communication on opinion-making, examined by means of readings, guest speakers, field projects. (Fall)

Second Group

101 **Bioacoustics** (3) Brewe
Acoustic analysis of speech and the physiology of reception and processing of speech by the human auditory system. Prerequisite: BiSc 3–4 or 11–12 or equivalent; Psyc 1 or 5 or 6 or equivalent. (Fall)

103 **Biophonetics** (3) Linebaugh
Biological bases of speech production. Emphasis on the function of the nervous system, the respiratory system, and the vocal and articulatory mechanisms in the production of intelligible speech. Prerequisite: BiSc 3-4 or 11-12 or equivalent; Psyc 1 or 5 or 6 or equivalent. (Fall)

104 **Introduction to Speech Pathology** (3) Regnell
Survey of the field of speech pathology. The effect of body-system pathologies and environmental factors on the production of speech and language. Prerequisite: SpDr 103. (Spring)

105–6 **The Writing of Plays** (3–3) Claeyssens
Same as Engl 105–6. Prerequisite: Engl 9 or 10; 11 or 12; consent of instructor. The student should submit a writing sample to the instructor before registration.

108 **Introduction to Audiology** (3) Brewe
Survey of the field of audiology. The effect of body-system pathologies on the reception of speech and other acoustic stimuli. Procedures of pure-tone and speech audiometry. Clinical and educational services for the hearing impaired. Prerequisite: SpDr 101. (Spring)

111 **Business and Professional Speaking** (3) Reynol
Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors. (Fall)

112 Persuasion (3) — **Keller**

In-depth study of the principles and techniques of persuasive speaking, with emphasis on the psychological factors in audience analysis and adaptation. Prerequisite: SpDr 1 or permission of instructor. Recording fee, $4. (Spring)

113 Voice for the Theater (3) — **Jacobson**

The practice and application of voice production in four areas: skeletal alignment, breathing, resonance, and articulation. Emphasis is placed on individual awareness of the process of voice production and its application to dramatic texts. Prerequisite: SpDr 11 and permission of instructor. (Fall)

114 Introduction to Acting (3) — **Jacobson**

For non-dramatic art majors. Introduction to the principles of acting for stage and television. Practice in scene work and on-camera performance. (Spring)

115 Acting I (3) — **Garner**

Basic techniques of concentration, imagination, and character analysis. Concurrent registration in HKLS 115 required. Admission by permission of instructor. (Fall)

116 Acting II (3) — **Garner**

Principles of role development. Scene study, principally in 20th century realism. Concurrent registration in HKLS 116 required. Admission by audition. Prerequisite: SpDr 115. (Spring)

118 Structural Analysis of Speech and Language (3) — **Staff**

Development of skills in the phonetic/phonemic transcription and syntactic analysis of oral language samples. Prerequisite: Psyc 115 or equivalent. (Spring)

119 Clinical Procedures for Communication Disorders (3) — **Hillis**

Development of skill in precision treatment techniques for communication disorders. Emphasis on accountability of providers of clinical and educational services for the communicatively handicapped. Prerequisite: Psyc 121 and 131, or equivalent, and permission of instructor. (Fall)

121 Group Discussion and Conference Leadership (3) — **Reynolds**

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: SpDr 1 or permission of instructor. (Fall and spring)

126 Argumentation and Debate (3) — **Reynolds**

Study of the advocacy system; special emphasis on issue identification, use of evidence, and logical proof. Extensive practice in argumentative speaking. Recording fee, $4. Prerequisite: SpDr 1 or permission of instructor. (Spring)

127–28 Advanced Debate Practice (1–1) — **Keller**

Admission by permission of instructor, after one semester of satisfactory participation in intercollegiate debate program. May be repeated for a total of four semester hours of credit. (Fall and spring)

133 **Broadcasting in America** (3) Thiel
Study of the origins, structure, and nature of American broadcasting including the effects of television programming. (Fall)

134 **Radio Production** (3) Farrand
(Formerly Radio Production and Performance)
Introduction to the basic concepts of radio as a communication medium; emphasis on the design and production of a variety of radio programs. Prerequisite: permission of instructor. Recording fee, $5 (Spring)

135–36 **Radio Workshop** (1–1) Farrand
Practical work in campus radio station. Admission by permission of instructor, after one semester of satisfactory participation in WRGW activities. May be repeated for a total of four semester hours of credit. (Academic year)

141 **Negotiations and Conflict Resolution** (3) Keller
Speech communication factors involved in negotiation of conflicts. Use of models and simulations. (Summer)

143 **Origins of Contemporary Rhetorical Theory** (3) Reynolds
Study of rhetorical theory and method as they evolved in the Western world from the classical period to the present. (Fall, even years)

144 **History and Criticism of American Public Address** (3) Reynolds
Study of American oratory from its pre-Revolution origins to the present day, interpreted in terms of issues and movements. (Spring, odd years)

145 **Television Production** (3) Thiel
(Formerly Television Production and Performance)
Basic course in television production techniques and skills. Programming, directing, script-writing, and other aspects of television production. Extensive practice in working television equipment; emphasis on various in-studio projects. Recording fee, $5. Prerequisite: SpDr 134. (Fall)

146 **Advanced Television Production** (3) Thiel
(Formerly Advanced Television Production and Performance)
Advanced study and practice of television production techniques. Students are expected to demonstrate skill in working with studio equipment and in the development of television programs from original concepts to final productions. Recording fee, $5. Prerequisite: SpDr 134 and 145. (Spring)

147 **Innovations in Television Communication** (3) Farrand
Utilization of television technology for non-broadcast purposes (i.e. medical, legal, therapeutic, artistic, and educational). Prerequisite: SpDr 133, 134, and 145. (Fall)

148 **Innovations in Television Production** (3) Farrand
Advanced production work in areas described in SpDr 147. Prerequisite: SpDr 133, 134, 145, and 147. (Spring)



149 Communicative Effects of Broadcast Programming (3) Thiel

Theories and research pertaining to issues, controversies, and problems of cultural conditioning in American broadcast programming. Includes effects of violence on television, childrens' programming, bias in the news, political imagery. Prerequisite: SpDr 133. (Spring)

151 Stagecraft (3) **Sabelli**

Lecture (2 hours), laboratory (1 hour). Theories and practicum in construction, rigging, and scene painting. (Fall and spring)

152 Advanced Stagecraft (3) **Sabelli**

Lecture (2 hours), laboratory (1 hour). Theories and practicum in the fundamentals of lighting and sound for the theater and television. (Fall and spring)

154 Directing (3) **Garner**

Fundamentals of script analysis, casting and rehearsal techniques. Prerequisite: Admission by permission of instructor. Laboratory fee, $5. (Fall)

155 Play Production Practice I (1) **Sabelli**

Theory and practicum in makeup design or property design. (Fall)

156 Play Production Practice II (1) **Sabelli**

Theory and practicum in scene painting, stage management, or theater architecture. (Spring)

161–62 Theatrical Styles (3–3) **Tauss**

Detailed study of the culture, climate, and production techniques of significant periods of drama. Prerequisite: SpDr 165–66. (Academic year)

163 Musical Theater (6) Sabelli and Jacobson

(Formerly 3 credits)

Growth of American musical theater. Development of all its components: libretto, dance, composition, lyrics, and the overall fabric of production. (Summer)

165–66 History of the Theater (3–3) Jacobson

An examination of the development and growth of the theater from its beginnings to the present. SpDr 165: Greek through Restoration. SpDr 166: the 18th century to the present. (Academic year)

169 Introduction to Creative Dramatics (3) **Staff**

Study of philosophies and practices underlying dramatics. Materials and methods for conducting improvised dramatic activities. (Spring)

***192 The American Cinema** (3) **Mergen**

History and criticism of American films. The course will enable the student to recognize and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture.

*Joint offering of the Department of Speech and Drama and the American Studies Program.

193 **Scene Design** (3) Sabelli
Fundamental study of scenography, including drafting, rendering and model construction. (Fall)

195 **Costume History and Construction** (3) Taus
History of fashion in Western civilization from ancient Egypt to the present. Laboratory work in costume construction. (Fall)

196 **Independent Study** (1 to 6) Staff
Independent research and special projects. Open only to undergraduate students in their senior year. Before students are permitted to register for SpDr 196, they must submit a written proposal of the plan of study and obtain approval of the staff member who will be directing the study and of the department chairman.

Third Group

SpDr 268–290 and 295 are for Master of Arts candidates in the field of speech pathology and audiology; other students may be admitted by permission of the department.

215–16 **Acting: Scene Study** (3–3) Jacobson
Scene work in modern, classic, and other nonrealistic drama. Admission by audition. Both courses may be repeated once for credit. Recording fee, $4. (Academic year)

251 **Advanced Scene Design** (3) Sabelli
Exploration of all styles of traditional and contemporary scenography. Creative projects include rendering, model construction, costume design, lighting design, and properties design. Admission by permission of instructor. (Spring, odd years)

252 **Advanced Costuming** (3) Taus (Spring)
Study of special design, style, and construction problems.

255 **Lighting Design** (3) Sabelli
Theory and execution of lighting design for theater and television. Prerequisite: SpDr 152. (Spring, even years)

256 **Directing Seminar** (3) Garoni
Problems in directing plays from selected periods. May be repeated for credit. (Fall)

257 **Modern Trends** (3) Staff
Study of recent developments in dramatic theory, literature, and production. (Fall, even years)

258 **Theater Management** (3) Staff
Theory and practice in theater management: promotion, box office and house management. Admission by permission of instructor. (Fall, odd years)

*267 **Interdisciplinary Study of Language Disorders** (3–6)
(Formerly 3 credits)
For graduate students in education, speech and hearing, and psy

* An interdisciplinary course offered by the Departments of Education, Psychology, and Speech and Drama.

chology. Psycho-educational team participation, team diagnosis and analysis of case studies. Multidisciplinary understanding of philosophies of learning and treatment of symbolic malfunctioning. Admission by permission of instructor. (Spring)

268 **Clinical Practice in Communication Disorders** (1–3) **Staff**

Supervised clinical practice in the evaluation and treatment of communication disorders. May be repeated for a total of three semester hours of credit. (Fall and spring)

269 **Community Programs in Communication Disorders** (3) **Herer**

Methods and procedure for the planning, management, and operation of hospital, school, and other community programs for the communicatively handicapped. (Spring)

271 **Evaluation of Speech Articulation Disorders** (2) **Regnell**

Evaluation of persons with speech articulation disorders: staffing of clinical cases, test demonstrations, critical evaluations of speech articulation testing procedures. Laboratory fee, $5. (Fall)

272 **Etiology of Speech Articulation Disorders** (2) **Hillis**

Biological, linguistic, and psychological bases for disorders of speech articulation; staffing of clinical cases. Laboratory fee, $5. (Spring)

273 **Treatment of Speech Articulation Disorders** (2) **Regnell**

Treatment procedures of persons with disorders of speech articulation; emphasis on programmed and other objective procedures for the improvement of speech articulation; staffing of clinical cases. Laboratory fee, $5.

274 **Evaluation of Fluency Disorders** (2) **Hillis**

Theories of the etiology of stuttering and related disorders; procedures for evaluating fluency disorders. Laboratory fee, $5. (Fall)

275 **Treatment of Fluency Disorders** (2) **Hillis**

Treatment procedures for disorders of speech fluency. Laboratory fee, $5. (Spring)

276 **Fluency Disorders in Children** (2) **Hillis**

Developmental aspects of stuttering; evaluation and treatment of fluency disorders in children. Laboratory fee, $5.

277 **Clinical Evaluation of Language Disorders** (3) **Staff**

Evaluation of language disorders in children and adults; class staffings of language pathology cases, test demonstrations, and critical evaluations of formal and informal language testing procedures. Laboratory fee, $7.50. (Fall)

278 **Applied Research in Language Disorders** (3) **Linebaugh**

Current neurolinguistic and psycholinguistic research related to language pathologies in children and adults; emphasis on the treatment of aphasia in adults including demonstrations of objective procedures for charting clinical progress. Laboratory fee, $7.50. (Spring)

279 **Clinical Treatment of Language Disorders in Children** (3) **Linebaugh**

Current language therapy programs for children and critical evalua-

tion of these programs in light of modern psycholinguistic concepts emphasis on objective procedures for attaining or modifying goals in language therapy for children with various handicapping conditions. Laboratory fee, $7.50. (Summer)

280 Functional Voice Disorders (2) Regnell

Review of the normal structure and function of the vocal mechanism. acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for persons with functional voice disorders. Laboratory fee, $5. (Fall)

281 Alaryngeal Speech (2) Regnell

Acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for laryngectomized persons. Laboratory fee, $5. (Spring)

282 Organic Voice Disorders (2) Regnell

Acquisition of knowledge and of clinical/educational skills in providing speech evaluation and treatment for persons with organic voice disorders; special consideration given to the management of voice disorders in children. Laboratory fee, $5. (Spring)

283 Aural Rehabilitation (3) Brewer

Systems, principles, and methods of auditory training and speech reading, including development of lesson plans and their application in resolving communication problems of acoustically-handicapped individuals. Laboratory fee, $7.50. (Fall)

284 Advanced Clinical Audiology (3) Bowling

Principles and methods underlying assessment of auditory disorder. emphasis on bone conduction, masking, and speech intelligibility Clinical implications, tests; demonstration and practicum. Laboratory fee, $7.50. (Fall)

285 Hearing Aids (3) Brewer

Discussion of hearing-aid characteristics and electroacoustic measurements; hearing-aid effectiveness in improving communicative efficiency; procedures for selection and clinical evaluation of hearing aids; counseling of the patient. (Spring)

286 Special Auditory Tests (3) Bowling

Special speech and pure tone audiometric techniques for differentiating conductive, cochlear, and retro-cochlear lesions, for identifying functional hearing losses. Clinical application of tests and interpretation of results. Laboratory fee, $7.50. (Fall)

287 Auditory Processing (3) Bowling

Detailed study of the factors which affect auditory perception and comprehension; methods and procedures used in identifying disorders of auditory perception and comprehension. Laboratory fee $7.50. (Spring)

288 Psychosocial Aspects of Hearing Loss (3) Bowling

Consideration of the rationale and procedures for evaluating the social and emotional behavior as well as the intellectual potential of those with impaired hearing. Laboratory fee, $7.50. (Spring)

289 **Impedance Audiometry and Middle Ear Function** (3) Staff
(Formerly Pediatric and Impedance Audiometry)
Development of skills in impedance audiometry and audiological assessment of middle ear function. Laboratory fee, $7.50. (Fall)

290 **Management of the Hearing-impaired Child** (3) Brewer
Overall management approach to the hard-of-hearing child including diagnosis, parent counseling, amplification, educational placement, treatment programs and procedures, and re-evaluation. Laboratory fee, $7.50. (Summer)

292 **Language Intervention in the Schools** (3) Staff
Analysis of language performance problems of school children and development of intervention strategies. For special education teachers, learning disabilities specialists, remedial reading specialists, audiologists, speech pathologists, and teachers of the hearing-impaired. Professional experience in one of these fields is recommended, but not required. (Summer)

294 **Independent Research in Dramatic Art** (arr.) Staff
May be repeated for credit. (Fall and spring)

295 **Independent Research in Speech and Hearing** (arr.) Staff

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

STATISTICS

Professors H.F. Bright, S. Kullback *(Emeritus)*, H.W. Lilliefors, A.D. Kirsch, R.H. Shumway, J. Cornfield, J.L. Gastwirth, L. Shaw *(Research)*, N. Mantel *(Research)*, D. Krueger *(Research)*, S.W. Greenhouse *(Chairman)*, N.D. Singpurwalla *(Research)*
Professorial Lecturers F.C. Leone, J. Bailar III
Associate Professors C.T. Ireland, R.E. Thomas, J.M. Lachin III *(Research)*
Associate Professorial Lecturers M.A. Schwartz, J.H. Ware, K.M. Wolter
Assistant Professors J.P. Dirkse III, S.H. Li *(Research)*
Adjunct Assistant Professor J.K. Kern
Assistant Professorial Lecturers W. Rutiser, T.C. Teeples

Bachelor of Arts or Bachelor of Science with a major in applied statistics (departmental) or mathematical statistics (departmental) or statistics with an option in computer science (departmental)—The following requirements must be fulfilled:

1. The general requirements as stated on pages 74–75, 80–87. (Students should consult the departmental advisor regarding courses to be taken in satisfying the requirements for meaningful initiation into the humanities and social studies.)
2. Prerequisite courses for all three majors—Math 31, 32; Stat 91.
3. (a) Required course for the applied statistics major—Math 124. (Courses in computer science and some field of application are recommended. Foreign language is not required for this major.)
   (b) Required courses in related areas for the mathematical statistics major

Math 124, 139, 140, 157; two years of introductory French, German or Russian, or equivalent. (Courses in computer science, mathematics, and some field of application are recommended.)

(c) Required courses for the statistics major with an option in computer science—Math 33, 113, 124. (Foreign language is not required for this major, but it is recommended for students planning to go to graduate school.)

4. (a) Required courses in the applied statistics major—Stat 106, 110, 117, 118, 157–58, 189; plus three approved second-group courses in statistics.

(b) Required courses in the mathematical statistics major—Stat 106, 117, 118, 157–58, 189–90; plus three approved second-group courses in statistics.

(c) Required courses in the statistics major with an option in computer science—Stat 106, 110, 114 (in that order), 117, 118, 157–58, 189; plus two approved electives in mathematics and statistics (Math 101, 153, 270, and Stat 198 are recommended).

To assure a balanced program, departmental approval of electives is required for all majors.

Students who seek Special Honors in statistics should inquire of the Department for a statement of its policy.

Master of Science in the field of applied statistics or *Master of Arts in the field of mathematical statistics*—The program of study consists of 30 semester hours of course work without a thesis. In exceptional cases the department may approve a program of study consisting of 24 semester hours of course work plus a thesis, equivalent to six additional semester hours. Candidates must pass a written Master's Comprehensive Examination and must fulfill the tool requirement by passing either a reading knowledge examination in an acceptable foreign language or an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool. For prerequisites and additional requirements, see below.

Master of Science in the field of applied statistics—Prerequisite: a bachelor's degree with a major in applied statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent required courses, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 90–98, including a minimum of 18 semester hours of statistics. Courses are selected in consultation with the advisor.

Master of Arts in the field of mathematical statistics—Prerequisite: a bachelor's degree with a major in mathematical statistics from this University, or an equivalent degree. If undergraduate study did not include equivalent required courses, those courses must be taken as prerequisite to graduate study.

Required: the general requirements, pages 90–98, including Stat 201–2 and 217–18. The remaining 18 semester hours must be selected in consultation with the advisor.

Doctor of Philosophy in the field of mathematical statistics—Prerequisite: the degree of Master of Arts in the field of mathematical statistics from this University, or an equivalent degree.

Required: the general requirements, pages 90–92, 98–100. A minimum of 24 semester hours of course work must be taken in residence at this University before the General Examination may be completed. The General Examination consists of two written parts, each followed by an oral examination. Part I covers mathematics and probability and may be taken after successful completion of Stat 259–60 or 273–74. Part II may be taken after the successful completion of the remaining core courses (Stat 201–2, 217–18, 257–58, 263–64, 265–66, 285) and

electives selected in consultation with the advisor. The tool requirement may be fulfilled by passing a reading knowledge examination in one foreign language and an examination in computer language. The successful completion of course work in computer programming does not obviate the requirement to pass a special examination should the computer option be elected as a tool.

Research Fields: Bayesian inference, biostatistics, design of experiments, information theory, multivariate analysis, nonparametric statistics, probability, robust methods, sampling, statistical inference, stochastic processes, and time series analysis.

Departmental prerequisite: One entrance unit in algebra is prerequisite to all first-group courses in statistics.

First Group

*51 **Introduction to Business and Economic Statistics** (3) — Bright, Kern

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, times series, index numbers. Laboratory fee, $18. (Fall and spring)

*53 **Introduction to Statistics in Social Science** (3) — Staff

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation. Laboratory fee, $18. (Fall and spring)

*91 **Principles of Statistical Methods** (3) — Lilliefors

Probability, frequency distributions and their characteristics, descriptive measures, estimation, tests of hypotheses, regression and correlation. Laboratory fee, $18. (Fall and spring)

†97 **Introduction to Computer Programming** (3) — Staff

Lecture (2 hours), laboratory (2 hours). Computer and programming concepts. High-level language programs written by students will be run on the University computer. Laboratory fee, $25. (Fall and spring)

Second Group

103 **Statistics in Business** (3) — Staff

Advanced study of statistical techniques in business. Prerequisite: Stat 51 or equivalent. (Spring)

105 **Statistics in the Behavioral Sciences** (3) — Kirsch

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or equivalent and satisfactory performance on a placement examination. Laboratory fee, $18. (Fall and spring)

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* Stat 51, 53, 91, and 127 are related in their subject matter, and credit hours for only one of the four may be applied toward a degree.
† Credit towards a degree will not be given for both Stat 97 and Stat 197.

106 **Introduction to Computing** (3) Thomas

Development of basic computing ideas using a high-level language. Emphasis on careful design and implementation of programs using "structured programming." Prerequisite or concurrent registration: Math 31, or permission of the instructor. Laboratory fee, $25. (Fall)

110 **Computer Programming** (3) Thomas and Staff

Lecture (2 hours), laboratory (2 hours). Computer concepts beyond the introductory level; an introduction to assembly language and advanced high-level language programming. Prerequisite: Stat 106. Laboratory fee, $25. (Spring)

111 **Business and Economic Statistics I** (3) Thomas and Staff

Statistical methods appropriate for applications in economics and business. (Fall)

112 **Business and Economic Statistics II** (3) Staff

Continuation of Stat 111 with emphasis on techniques of regression, Chi-square, sampling designs, index numbers, and other topics used in economics and business. Prerequisite: Stat 111 or equivalent. (Spring)

114 **Data Structures** (3) Staff

Files and file systems. Basic structure of processing operations, creation updating, sorting, merging, searching, linkage, hashing. Introduction to data processing, storage, and retrieval. Emphasis on computer techniques. Prerequisite: Stat 110. Laboratory fee, $25. (Fall)

117 **Analysis of Variance** (3) Staff

Lecture (3 hours), laboratory (1 hour). Introduction to the design of experiments and analysis of variance; random block, factorial, Latin square, and analysis of covariance. Prerequisite: Stat 110. Laboratory fee, $18. (Spring)

118 **Regression Analysis** (3) Staff

Lecture (3 hours), laboratory (1 hour). Regression and correlation theory: simple, partial, and multiple. Prerequisite: 3 semester hours selected from Stat 51, 53, 91. Laboratory fee, $18. (Fall and spring)

119 **Bases of Statistical Decision-making** (arr.) Kern

For students in the Navy Graduate Financial Management Program only. Introduction to techniques of decision-making; emphasis on applications rather than theory.

*123 **Introduction to Econometrics** (3) Staff

Construction and testing of economic models: regression theory, parameter estimation, and statistical techniques applicable to economic models. Prerequisite: Econ 101, 102; Math 31 or 51; Stat 111. (Fall and spring)

†127 **Statistics for the Biological Sciences** (3) Greenhouse

Introduction to statistical techniques and reasoning applicable to the biomedical and related sciences. Properties of basic probability func-

* An interdepartmental course offered by the Departments of Statistics and Economics.
† Stat 51, 53, 91, and 127 are related in their subject matter, and credit hours for only one of the four may be applied toward a degree.

tions: binomial, Poisson, and normal. Data analysis, inference, and experimental design. (Fall and spring)

131 **Contingency Table Techniques** (3) **Staff**

Analysis of multidimensional contingency tables, including estimation, tests of hypotheses, and log-linear regression. Prerequisite: Stat 118 or permission of instructor. Laboratory fee, $18. (Spring)

153–54 **Mathematical Models in Population Genetics** (3–3) **Staff**

Basic elements of genetics and cell reproduction, deterministic models of gene frequency; the Hardy-Weinberg law; effects of mutation, migration, and selection on gene frequency; multiple loci and multiple allele models; inbreeding; Fisher's fundamental theorem of natural selection; stochastic models of changes in gene frequency, including methods of direct product branching processes and diffusion equation methods. (Academic year)

155 **Introduction to Probability** (3) **Dirkse**

Probability distribution, Bayes' theorem and postulate, mathematical expectation, laws of large numbers. Prerequisite: one entrance unit in algebra. (Summer)

157–58 **Introduction to Mathematical Statistics** (3–3) **Dirkse**

Distribution theory, sampling theory, estimation, hypothesis testing, regression analysis, experimental design. Prerequisite: differential and integral calculus. (Academic year)

159 **Principles of Bayesian Statistics** (3) **Staff**

Lecture (3 hours), laboratory (1 hour). Probability as a measure of uncertainty of knowledge; concepts and techniques of Bayesian inference. Prerequisite: three semester hours in introductory statistics, or equivalent. Laboratory fee, $13.

161–62 **Information Theory** (3–3) **Staff**

Elementary development of information theory and applications to communication, coding, psychology, linguistics, etc. Prerequisite: three semester hours selected from Stat 155, 157, 159, 189. Laboratory fee, $18.

165–66 **Multivariate Techniques** (3–3) **Shumway**

Application of multivariate statistical techniques to multidimensional research data from the behavioral, social, biological, medical, and physical sciences. Prerequisite: Stat 117, 157–58, and Math 124. Laboratory fee, $18. (Academic year)

181 **Applied Time Series Analysis** (3) **Shumway**

Auto- and cross-correlation, spectral analysis, coherence, transfer relations, linear filters, seasonal adjustment, mean square regression, autoregressive moving average models, forecasting, Box-Jenkins methods, spectral analysis of variance, and signal detection and discrimination methods. Prerequisites: a first course in statistics, calculus. Laboratory fee, $30. (Spring)

183 **Intermediate Statistical Laboratory** (3) **Staff**

Applications to advanced experimental design and other topics. Admission by permission of instructor. Laboratory fee, $25. (Fall or spring)

187 **Theory of Sampling** (3) Staff
Problems of sampling and sample design. Prerequisite: Stat 91 or equivalent. (Fall)

188 **Nonparametric Statistical Inference** (3) Lilliefors
Statistical inference when the form of the underlying distribution is unspecified. Prerequisite: Stat 91 or equivalent. (Spring)

189–90 **Mathematical Probability and Applications** (3–3) Staff
Combinatorial analysis, conditional probability, stochastic independence, probability distributions, random variables, laws of large numbers. Prerequisite: differential and integral calculus. (Academic year)

191 **Statistics for Engineering and Management Sciences** (3) Leone
(Formerly Probabilistic and Statistical Methods for Operations Research)
Applied probability; discrete and continuous distributions; descriptive statistics; principles and applications of estimation and testing; correlation and single and multi-variate regression; distribution-free tests. Prerequisite: Math 31. (Fall)

192 **Experimental Design for Engineering and Management Sciences** (3) Leone
Introduction to principles of design; models for the analysis of variance; crossed and nested experiments; factorials; response surfaces. Prerequisite: Stat 191 or permission of the instructor. (Spring)

193 **Survey Design** (3) Staff
Applications of survey methodology, including questionnaire design and wording, field methods, interviewer and nonresponse biases, and quality-control procedures. Problems in sample frame development. Prerequisite: Stat 187 or equivalent, and permission of instructor. (Spring)

195 **Reading and Research in Statistics** (arr.) Staff
May be repeated once for credit. (Fall and spring)

*197 **Digital Computer Programming with Applications** (3) Thomas
Lecture (2 hours), laboratory (2 hours). Use of digital computer in statistical and other computational work. Writing, debugging, and running programs on the digital computer in the University Computer Center. Prerequisite: Stat 118; or Math 32; or permission of instructor. Laboratory fee, $25. (Fall and spring)

198 **Current Topics in Computer Programming** (3) Rutiser
Concepts of programming, programming languages, operating systems, nonnumeric programming compiler techniques. Prerequisite: Stat 114 or permission of instructor. Laboratory fee, $25. May be repeated for credit. (Spring)

Third Group

201–2 **Mathematical Statistics** (3–3) Ireland
Distribution theory, sampling theory, estimation, sufficient statistics.

* Credit will not be given for both Stat 97 and Stat 197.

hypothesis testing, analysis of variance, multivariate normal distribution. Prerequisite: advanced calculus or permission of instructor. (Academic year)

205 **Data Analysis for Policy Decisions** (3) Kirsch

The framing of questions of importance in policy and the use of existing data bases to answer these questions. Laboratory fee, $20. Prerequisite: Stat 105 or equivalent. May be repeated once for credit. (Summer)

206 **Factor Analysis** (3) Kirsch

Concepts of factor analysis and their utility in various phases of research and related topics, including cluster analysis. Prerequisite: Stat 105 or equivalent and permission of instructor. Laboratory fee, $18. (Summer)

217–18 **Advanced ANOVA and Experimental Design** (3–3) Staff

Advanced theory and application of general linear hypothesis to experimental designs. Prerequisite: Stat 157–58 or 201–2; Math 124. (Academic year)

221 **Design of Experiments for Behavioral Sciences** (3) Kirsch

Applications of advanced experimental design to research problems in behavioral sciences and education. Prerequisite: Stat 105 or 118 or equivalent and permission of instructor. Not open to graduate students in Statistics. (Spring)

223–24 **Bayesian Inference** (3–3) Cornfield

Systematic development of Bayesian viewpoint, with applications to the classical problems of statistics. Prerequisite: Stat 201–2. (Academic year 1979–80 and alternate years.)

225–26 **Introduction to Biostatistics** (3–3) Cornfield

Probability models, inference, and study design as applied to biomedical investigations. Prerequisite: Stat 201–2. (Academic year 1978–79 and alternate years.)

231 **Contingency Table Analysis** (3) Staff

A study of the theoretical bases underlying the analysis of categorial data. Prerequisite: Stat 201–2 or 257–58. (Not offered academic year 1978–79.)

242 **Advanced Statistical Problems in Economic Analysis** (3) Gastwirth

Applications of advanced theory to economic data. (Not offered academic year 1978–79.)

257–58 **Distribution Theory** (3–3) Staff

Properties of distribution and characteristic functions, probability bounds, large- and small-sample theory, order statistics. Prerequisite: Stat 157–58 or 201–2. (Academic year 1979–80 and alternate years.)

259–60 **Advanced Mathematical Probability** (3–3) Dirkse

Measure theory, probability spaces, random variables, probability distributions, sequences and sums of random variables, conditioning, limit theorems, martingales. Prerequisite: Math 224 or equivalent. (Academic year 1978–79 and alternate years.)

261 **Sequential Design and Analysis** (3) Ware
Wald's theory of sequential designs, optional stopping, choice of sequential experiments. Prerequisite: Stat 201–2. (Spring, odd years.)

262 **Nonparametric Inference** (3) Lilliefors
Inference when the form of the underlying distribution is unspecified (Fall, even years.)

263–64 **Topics in Statistical Inference** (3–3) Lilliefors
Estimation, testing of statistical hypotheses, tests of significance, likelihood ratio, Bayesian inference and the use of prior knowledge, decision theory. Prerequisite: Stat 201–2 or 257–58. (Academic year 1978–79 and alternate years.)

265–66 **Multivariate Analysis** (3–3) Shumway
Tests of significance, homogeneity, independence, canonical and vector correlations, multivariate normal distribution, generalized Student's ratio, multivariate linear hypothesis, and analysis of variance. Prerequisite: Stat 201–2 or 257–58; Math 124. (Academic year 1979–80 and alternate years.)

269 **Statistical Decision Theory** (3) Ware
Wald's theory of decision functions. Sequential analysis. Multi-decision problems. Existence theorems, complete class theorems, and other general decision theoretic results. Prerequisite: Stat 189–90; and 201–2 or 257–58. (Fall, even years.)

273–74 **Stochastic Processes** (3–3) Ware
Fundamental notions of Markov chains and processes, generating functions, recurrence, limit theorems, random walks, Poisson processes, birth and death processes, applications. Prerequisite: Stat 189–90; and 201–2 or 257–58. (Academic year 1979–80 and alternate years.)

*275 **Econometrics I: Introduction** (3) Staff
Single equation models of economic behavior. Statistical methods for testing economic hypotheses and estimating parameters. Introduction to simultaneous equations problems. Prerequisite: Stat 157–58 or equivalent, or permission of instructor. Recommended: a course in matrix theory. (Fall)

*276 **Econometrics II: Simultaneous Equations Models** (3) Staff
Economic models and simultaneous equations systems. Prerequisite: Stat 275. (Spring)

*279 **Methods in Economic Statistics** (3) Staff
Statistical methods, such as regression, curve fitting, and index numbers used to summarize and analyze economic data. Prerequisite: Stat 111 or equivalent. (Fall and spring)

281 **Time Series Analysis I: Foundations** (3) Shumway
(Formerly Time Series Analysis)
Basic structure of stationary time series. Differentiation, integration, spectral representations, linear filtering, mean square estimation, the Finite Fourier Transform, laws of large numbers, autoregressive mov-

* An interdepartmental course offered by the Departments of Statistics and Economics.

ing average processes. Prerequisite: Stat 201–2 and 259–60 or 273–74. (Fall, even years.)

282 **Time Series Analysis II: Statistical Inference** (3) Shumway

Multivariate normal processes, spectral estimation, tests of hypotheses, regression, discrimination filtering, spectral analysis of variance. Prerequisite: Stat 281. (Spring, odd years.)

283 **Advanced Statistical Laboratory** (3) Staff

Application of the University computer to complex statistical problems on an individual study basis. Admission by permission of instructor. Laboratory fee, $25. May be repeated for credit only with permission of the Department. (Fall and spring)

285–86 **Seminar** (3–3) Staff

Admission by permission of instructor. (Fall and spring)

287–88 **Modern Theory of Sample Surveys** (3–3) Wolter

Application of statistical theory to the sampling of finite populations. Simple, stratified, cluster, double and subsampling. Special topics, including super-populations and randomized response. Prerequisites: Stat 91 and Math 32 or equivalent. (Academic year)

289 **Seminar: Current Topics in Biostatistics** (3) Staff

Discussion of selected current literature in clinical trials, epidemiology, automated diagnosis, and other topics of biomedical interest. Admission by permission of instructor.

*290 **Principles of Demography** (3) Staff

Introduction to basic demographic perspectives and data; methods for analysis of population size, distribution, and composition; determinants and consequences of population trends. (Fall)

*291 **Methods of Demographic Analysis** (3) Staff

Basic methods for analysis of mortality, natality, and migration; population estimates and projections; estimation of demographic measures from incomplete data. (Spring)

295 **Reading and Research** (3) Staff

May be repeated once for credit. (Fall or spring)

297 **Problems in Mathematical Statistics** (3) Staff

298 **Seminar: Special Topics** (3) Staff

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

Fourth Group

†378 **Seminar: Topics in Econometrics** (3) Staff

Limited to graduate students, primarily for doctoral students; offered as demand requires. A research seminar covering current econometric literature and special topics. Admission by permission of instructor.

* An interdepartmental course offered by the Departments of Economics, Geography and Regional Science, Sociology, and Statistics

† An interdepartmental course offered by the Departments of Statistics and Economics.

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

URBAN AND REGIONAL PLANNING—GRADUATE PROGRAM

Professors D.C. McGrath, Jr. *(Chairman)*, F. Belaunde-Terry *(Visiting)*
Adjunct Professor F. Gutheim
Professorial Lecturers N. Beckman, S.J. Bellomo
Associate Professors S. Greene, S.S. Fuller
Associate Professorial Lecturers S.D. MacDonald, R.M. Winick
Assistant Professor D. Gale

A program leading to the degree of Master of Urban and Regional Planning, which provides preparation for professional practice in the planning field, and areas of specialization in planning as components of programs leading to the degrees of Master of Public Administration, Doctor of Business Administration, and Doctor of Public Administration, are offered by the School of Government and Business Administration (see pages 133–64).

Second Group

153 **Principles of Urban Planning and Design** (3) Greene
Studio course for undergraduates. Basic elements of urban planning and design applied to community problems. Survey of planner's role in developing and implementing creative solutions to urban problems. (Fall)

Third Group

201 **Introduction to Urban and Regional Planning** (3) McGrath
Introduction to history, concepts, and activities of urban and regional planning. Discussion of trends in urbanism and the influences of technology and social change. (Fall, spring, and summer)

202 **Urban Planning Theory** (3) Gale
Development of the fundamental theories and concepts of urban growth and change, theories of the planning process, the role of politics in the planning process, and roles of the planner. Prerequisite: U&RP 201 or permission of instructor. (Fall and spring)

203 **Fundamentals of Urban Design** (4) Greene
Planning and design studio to develop and apply planning methods and graphic techniques, principles of land use and urban design, analysis of factors affecting community development and change. Open only to candidates for the degree of Master of Urban and Regional Planning. Laboratory fee, $15. Prerequisite: U&RP 201 or permission of instructor. (Spring)

204 Urban Development Planning (3) **Greene**

Planning and design studio: investigation of social, environmental, and technological factors in planning. Application of comprehensive planning process to typical problems of community growth and development. Laboratory fee, $15. Prerequisite: U&RP 203 or permission of instructor. (Fall)

205 Urban Housing (3) **Fuller**

Examination of the building industry, housing market characteristics, analytical techniques, national needs, costs, financing, federal programs, technology, rehabilitation, and policy formulation. Prerequisite: U&RP 201. (Spring)

206 Community Facilities Planning (3) **Fuller**

Planning implications of essential public facilities which comprise community infrastructure. Emphasis on developing an understanding of the special design, service, and locational requirements of each class of community facility, the relationships among facilities and their effects on urban development and the community at large. Prerequisite: U&RP 201 or permission of instructor. (Spring)

207 Land Development Planning (3) **McGrath**

Selected problems in urban and regional planning: applications of zoning, urban renewal and special programs available for the implementation of development plans. Prerequisite: U&RP 201 or permission of instructor. (Fall)

208 Urban Transportation Planning (3) **Winick**

Relationships between land use and the movement of goods and people in urban areas. Transportation planning principles, policy problems, methods for analyzing demand and systems for urban travel; roles of public agencies and private interests in the planning and development of various modes. Prerequisite: U&RP 201. (Spring)

209 Urban Transportation Models (3) **Bellomo**

Consideration of land use activity, trip generation and distribution, environmental impact, modal choice models, traffic assignment, and decision-making techniques. Review of detail studies, calibration, interactions, applications, and accuracy limitations of various mathematical models. Prerequisite: U&RP 208 or permission of instructor. (Fall)

210 Urban Development Economics (3) **MacDonald**

Economic forces affecting urban growth and change; relationships among cities, metropolitan areas, and regions in the context of the national economy; socioeconomic implications of urban land development policies; basic studies and methods of economic analysis. Prerequisite: Econ 217–18 or equivalent; U&RP 201. (Spring)

212 Methods of Urban and Regional Analysis (3) **Fuller**

Introduction to methods used to analyze, estimate, and forecast population, employment, income and economic growth and development. Includes time series, index numbers, sampling, regression, shift-share, and input-output. Prerequisite: Stat 51 or equivalent. (Fall)

213 **Social Factors in Urban Planning** (3) Gale

Residential location decisions as they affect land use in metropolitan areas. Middle class, elderly, and minority mobility patterns. Effects of discrimination, dislocation, condominiums, and historic preservation. Prerequisite: U&RP 201 or permission of instructor. (Summer)

215 **Advanced Planning Problems** (4) McGrath and Staff

Investigation of complex problems of the metropolitan region, analysis of findings, formulation of proposals, and presentation of material to faculty and cooperating groups. Multidisciplinary team and individual planning projects. Studio course. Laboratory fee, $15. Prerequisite: U&RP 203. (Spring)

218 **Metropolitan and Regional Planning** (3) Fuller

Multidisciplinary study of the methods of regional analysis and process of regional planning; development of projects of regional scale requiring problem analysis, synthesis, and plan formulation. Studio course. Laboratory fee, $15. Prerequisite: U&RP 203 and 213 or permission of instructor. (Fall)

232 **Urban Environment and the Planner** (3) Fuller

Exploration of the relationship between people and their urban environment; emphasis on the role of the urban planner. Theory, research, planning methods, current issues, and laws examined. Prerequisite: U&RP 201 or permission of instructor. (Spring)

240 **Federal and State Urban Policy Development** (3) Beckman

Investigation of contemporary trends in the evolution of federal and state governmental functions and programs affecting urban growth and development policy. Planning functions in the evolving relationships among units of federal, state, and metropolitan agencies. Prerequisite: U&RP 201 or permission of instructor. (Fall)

242 **Fiscal Policy and Urban Planning** (3)

Consideration of municipal fiscal conditions and their implications for urban planning. Examination of capital projects financing, tax policy and land use, and fiscal impact analysis of urban development. Prerequisite: U&RP 201 or permission of instructor. (Fall)

*277–78 **Historic Preservation** (3–3) Gutheim

The preservation movement and its literature. Review of current experience, preservation practice and techniques. Emerging aspects of historic preservation. Examples of historic, cultural and humanistic values affecting preservation activities. (Academic year)

290 **Special Topics in Urban and Regional Planning** (3) Staff

Experimental offering: new course topics and teaching methods. May be repeated once for credit. (Fall or spring)

295 **Research Methods** (3) Staff

Directed research and investigation of special problems in community development. May be repeated once for credit. (Fall and spring)

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* Joint offering of the History and Urban and Regional Planning Departments and the American Studies Program.

298 **Directed Readings and Research in Urban and Regional Planning** (3) — **Staff**

299 **Thesis Seminar** (3) — **Fuller**
Examination of thesis standards, research philosophy and methodology. (Fall and spring)

300 **Thesis Research** (3) — **Staff**
(Fall and spring)

Fourth Group

Fourth-group courses are limited to doctoral students. They are offered as the demand requires.

311–12 **Seminar: Public-Private Sector Institutions and Relationships** (3–3)

398 **Advanced Reading and Research** (arr.) — **Staff**
Limited to students preparing for the Doctor of Business Administration or Doctor of Public Administration general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) — **Staff**
Limited to Doctor of Business Administration or Doctor of Public Administration candidates. May be repeated for credit. (Fall and spring)

WOMEN'S STUDIES—GRADUATE PROGRAM

Associate Professorial Lecturer R.H. Osborn
Adjunct Assistant Professors E. Bloomfield, P.M. Palmer *(Coordinator for Academic Affairs)*, S.L. Connelly

Committee on Women's Studies

V.R. Allan, E. Bloomfield, L. Brandt, T.Z. Lavine, P.M. Palmer, R.H. Osborn

The Graduate School of Arts and Sciences offers an interdisciplinary program leading to the degree of Master of Arts in Special Studies with a concentration in Women's Studies, directed by the Committee on Women's Studies and drawing upon faculty from various departments within the university and resource persons in the community.

Women's studies seeks to examine and integrate the contributions of established academic disciplines to an understanding of the historical and contemporary role and status of women, and to provide a framework for the development of feminist research and analysis. Each student will work closely with an advisor in designing a program to meet individual research interests and professional goals. Prospective candidates should consult with the director of the Women's Studies Program.

Master of Arts in Special Studies with a concentration in Women's Studies—Prerequisite: a bachelor's degree from an accredited college or university. Students are expected to have completed the prerequisites to graduate courses.

Required: the general requirements, pages 90–98, and 36 semester hours of course work, with or without a thesis. At least 21 hours must be taken in arts and sciences departments. WStu 220 and 221 are required for all students;

WStu 283 and 295 are required for students who do not elect a thesis; WStu 299–300 are required for those who do elect a thesis. A maximum of 24 hours in women's studies is permitted. The remaining hours must be divided as equally as possible between two other fields. All candidates are required to pass a Master's Comprehensive Examination. There is no tool requirement.

Third Group

220 Perspectives on Women (3) Palmer
Research and theory from anthropology, economics, history, literature, philosophy, physiology, psychology, sociology. (Fall)

221 Research Issues in Women's Studies (3) Palmer
Socialization and the educational system, work and the economy, sexuality and the family, health and life cycle issues. Problem identification in these and other areas; introduction to current research. Prerequisite: WStu 220. (Spring)

225 Feminist Theory (3) Staff
Theoretical foundations of feminism in the U.S. Theories and proposals for change currently espoused. Although focus is primarily on feminism of contemporary white America, some third world and European thought will be considered. (Fall and spring)

235 Counseling and Career Development of Women (3) Osborn
Multidimensional analysis of factors, theories, problems, and practices in career development and its relationship to counseling women. (Fall)

240 Public Policy (3) Staff
(Formerly Women and Public Policy)
Systematic analysis of public policy formation at the federal, state, and local levels as it relates to the status of women. Strategies for change and impact of the women's movement. Team and individual research projects on executive decision-making, legislation and its implementation, and political party structures. (Fall and spring)

241 Women and the Law (3) Staff
Legal status of women. Emphasis on marital status, employment, media, education, health services, crime, and the Constitution. (Fall and spring)

251 Women, Literature, and the Arts Staff
Woman as subject and object. Examination of stereotypes, themes, language, patterns, and symbolism in works by and about women. Particular attention to the woman as artist and the development of feminist criticism. (Spring)

***260 Women in the American Work Force** (3) Palmer
Multidisciplinary analysis of women's role in the labor force and historical changes in that role. Societal view of women's work in the home and outside it; interrelationships of women in and out of the work force; women's contributions, traditionally and during national crises; class, race, and ethnic differences. (Fall)

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* Joint offering of the American Studies Program and the Women's Studies Program.

270 **Seminar: Selected Topics** (arr.) Staff

280 **Independent Study** (3) Staff
May be repeated for credit. Arrangements must be made with sponsoring faculty member prior to registration.

283 **Practicum in Women's Studies** (3) Palmer
Study of the changing status of women through supervised assignment to public and private agencies engaged in education, counseling, political action, and research. Placement arrangements should begin the semester prior to registration for this course.

284 **Practicum** (arr.) Palmer

295 **Independent Research in Women's Studies** (arr.) Staff
Individual library or field research. Program advisor's approval of a written proposal required.

299–300 **Thesis Research** (3–3) Staff

ZOOLOGY

See **Biological Sciences.**

FACULTY AND STAFF OF INSTRUCTION

Columbian College of Arts and Sciences

Graduate School of Arts and Sciences

School of Education and Human Development

School of Government and Business Administration

School of Public and International Affairs

EMERITI

Caroline Lander Adams, *Professor Emeritus of Botany*
B.A. 1925, Illinois College; M.S. 1928, University of Chicago; Ph.D. 1932, University of Wisconsin

Errett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri; M.D. 1921, Johns Hopkins University

Grover LaMarr Angel, *Professor Emeritus of Education*
B.A. 1929, High Point College; M.A. in Ed. 1946, Ed.D. 1952, George Washington University

Ruth Harriet Atwell, *Professor Emeritus of Physical Education for Women*
Ph.B. 1918, Denison University; M.A. in Ed. 1933, George Washington University

Richard Adrian Barrett, *Professor Emeritus of Business Administration*
B.A. 1930, Amherst College; M.B.A. 1932, Harvard University; D.B.A. 1972, George Washington University

Gretchen Rogers Bolwell, *Professor Emeritus of German*
B.A. 1930, M.A. 1931, George Washington University; Ph.D. 1938, Johns Hopkins University

Robert Whitney Bolwell, *Professor Emeritus of American Literature*
B.A. 1916, Case Western Reserve University; M.A. 1917, Ph.D. 1921, Columbia University; Litt.D. 1957, George Washington University

Paul William Bowman, *Professor Emeritus of Biology*
B.A. 1924, University of Pennsylvania; M.A. 1928, George Washington University; Ph.D. 1939, University of Virginia

John Withrow Brewer, *Professor Emeritus of Political Science and International Law*
B.A. 1926, M.A. 1930, Ph.D. 1932, Princeton University

Arthur Edward Burns, *Professor Emeritus of Economics*
B.A. 1931, M.A. 1934, University of California, Berkeley; Ph.D. 1935, George Washington University

Elizabeth Burtner, *Professor Emeritus of Physical Education*
B.A. 1927, Hood College; M.A. 1935, Columbia University

Paul Calabrisi, *Professor Emeritus of Anatomy*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. 1955, Cambridge University, England

Wesley Thomas Carroll, *Professor Emeritus of Education*
B.S. 1933, Iowa State University of Science and Technology; M.A. 1940, Ph.D. 1952, University of Nebraska

Richard Bernard Castell, *Director Emeritus of the Student Health Service*
B.A. 1932, M.D. 1935, George Washington University

James Harold Coberly, *Professor Emeritus of English*
B.A. 1933, M.A. 1938, Ph.D. 1949, George Washington University

Elbridge Colby, *Professor Emeritus of Journalism*
B.A. 1912, M.A. 1913, Ph.D. 1922, Columbia University

Oswald Symister Colclough, *Professor Emeritus of Law; Dean of Faculties Emeritus; Emeritus Director of the Patent, Trademark, and Copyright Research Institute*
B.S. 1920, U.S. Naval Academy; LL.B. 1935, Sc.D. 1961, George Washington University; LL.D. 1966, Muhlenberg College

Charles William Cole, *Professor Emeritus of English*
B.A. 1930, M.A. 1931, Ph.D. 1939, George Washington University

George Frederick Conner, *Associate Professor Emeritus of Business Administration*
B.S. 1929, U.S. Military Academy; M.B.A. 1938, Harvard University

Milton Crane, *Professor Emeritus of English*
B.A. 1937, M.A. 1938, Columbia University; M.A. 1941, Ph.D. 1942, Harvard University

Vincent James DeAngelis, *Professor Emeritus of Physical Education*
B.S. in P.E. 1939, M.A. in Ed. 1948, George Washington University

Alan Thomas Deibert, *Professor Emeritus of Romance Languages*
B.A. 1918, Gettysburg College; M.A. 1922, Harvard University

William Webster Diehl, *Professor Emeritus of Mycology*
B.A. 1914, Miami University; M.S. 1915, Iowa State University of Science and Technology; Ph.D. 1932, Harvard University

James Carlton Dockeray, *Professor Emeritus of Finance*
B.A. 1929, Ohio Wesleyan University; M.A. 1931, Ph.D. 1936, Ohio State University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Experimental)*
B.A. 1927, Ph.D. 1933, Yale University

Frederick Harrell Gibbs, *Professor Emeritus of Health Care Administration*
B.S. 1956, University of Maryland; M.H.A. 1959, University of Minnesota

Raymond George Hanken, *Professor Emeritus of Human Kinetics and Leisure Studies*
B.S. in P.E. 1938, M.A. in Ed. 1952, George Washington University

Ira Bowers Hansen, *Professor Emeritus of Zoology*
B.S. 1928, M.A. 1929, Wesleyan University; Ph.D. 1932, University of Chicago

Clarence Richard Hartman, *Assistant Professor Emeritus of Microbiology*
B.A. 1933, M.D. 1936, George Washington University

Henry William Herzog, *Vice President and Treasurer Emeritus*
B.S. in C.E. 1930, LL.D. 1978, George Washington University

Thomas Willard Holland, *Professor Emeritus of Labor Economics*
B.A. 1923, University of Michigan; LL.B. 1934, Columbia University; Ph.D. 1939, University of Wisconsin

Thelma Hunt, *Professor Emeritus of Psychology*
B.A. 1924, M.A. 1925, Ph.D. 1927, M.D. 1935, George Washington University

Herbert Jehle, *Professor Emeritus of Physics*
Dr.Ing. 1933, Institute of Technology, Berlin

Joe Lee Jessup, *Professor Emeritus of Business Administration*
B.S. in B.A. 1936, University of Alabama; M.B.A. 1941, Harvard University; LL.D. 1964, University of Chungang, Korea

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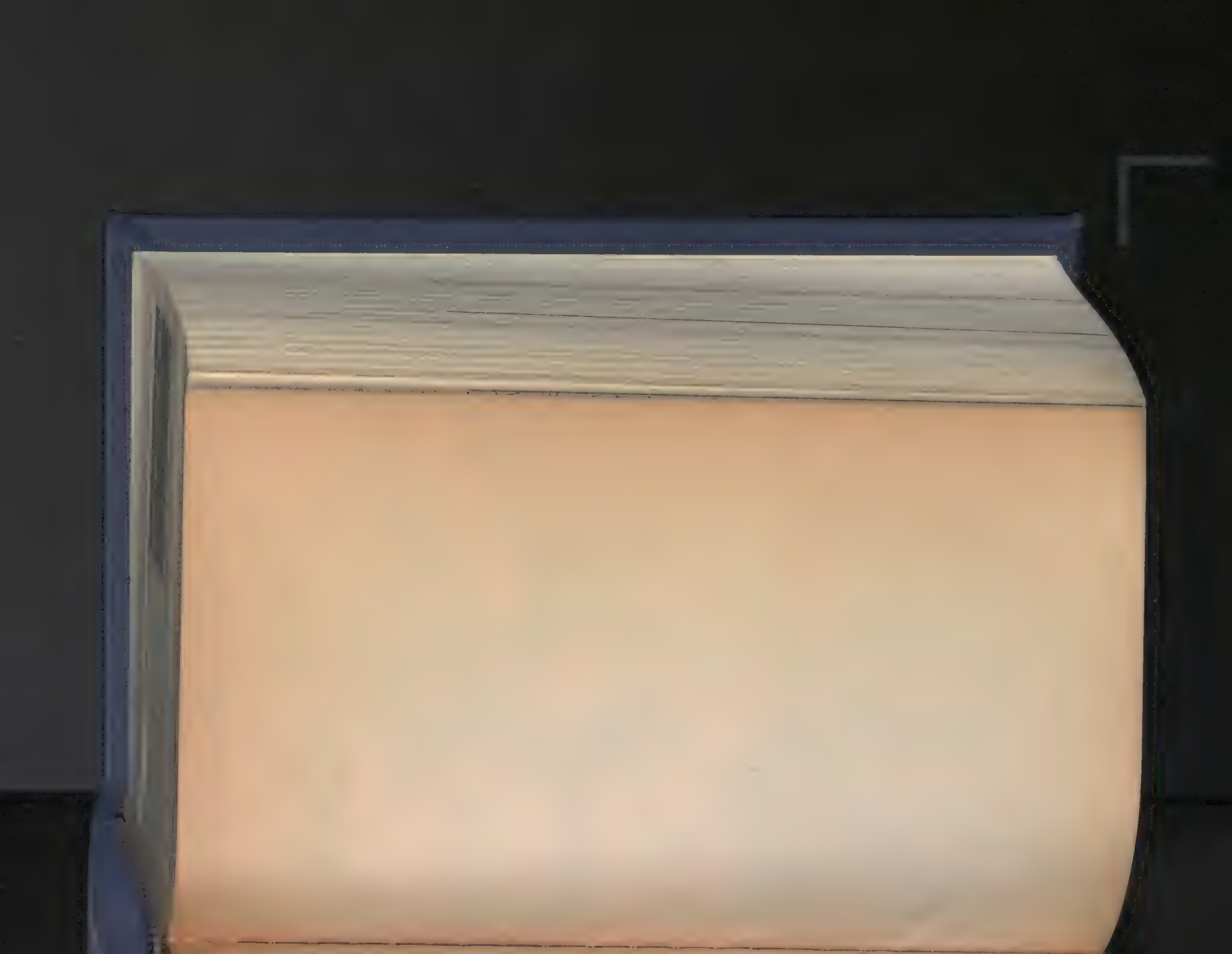
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COLLEGES AND SCHOOLS—DEGREE PROGRAMS

Columbian College of Arts and Sciences: Associate in Arts (A.A.), Associate in Arts in General Studies (A.A. in Gen.Std.), Associate in Science in Cartographic Science (A.S. in Cart.Sc.), Associate in Science in Geodesy (A.S. in Geod.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.Std.), Bachelor of Science (B.S.), Bachelor of Science in Cartographic Science (B.S. in Cart.Sc.), Bachelor of Science in Geodesy (B.S. in Geod.), and Bachelor of Science in Oceanography (B.S. in Ocea.)

Graduate School of Arts and Sciences: Master of Arts (M.A.), Master of Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), Master of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master of Science (M.S.), Master of Science for Teachers (M.S. for Teachers), Master of Science in Forensic Science (M.S.F.S.), Master of Science in Special Studies (M.S. in Sp.Std.), and Doctor of Philosophy (Ph.D.)

School of Medicine and Health Sciences: Associate in Science (A.S.), Bachelor of Science (B.S.), Bachelor of Science in Health Science (B.S. in H.Sc.), and Doctor of Medicine (M.D.)

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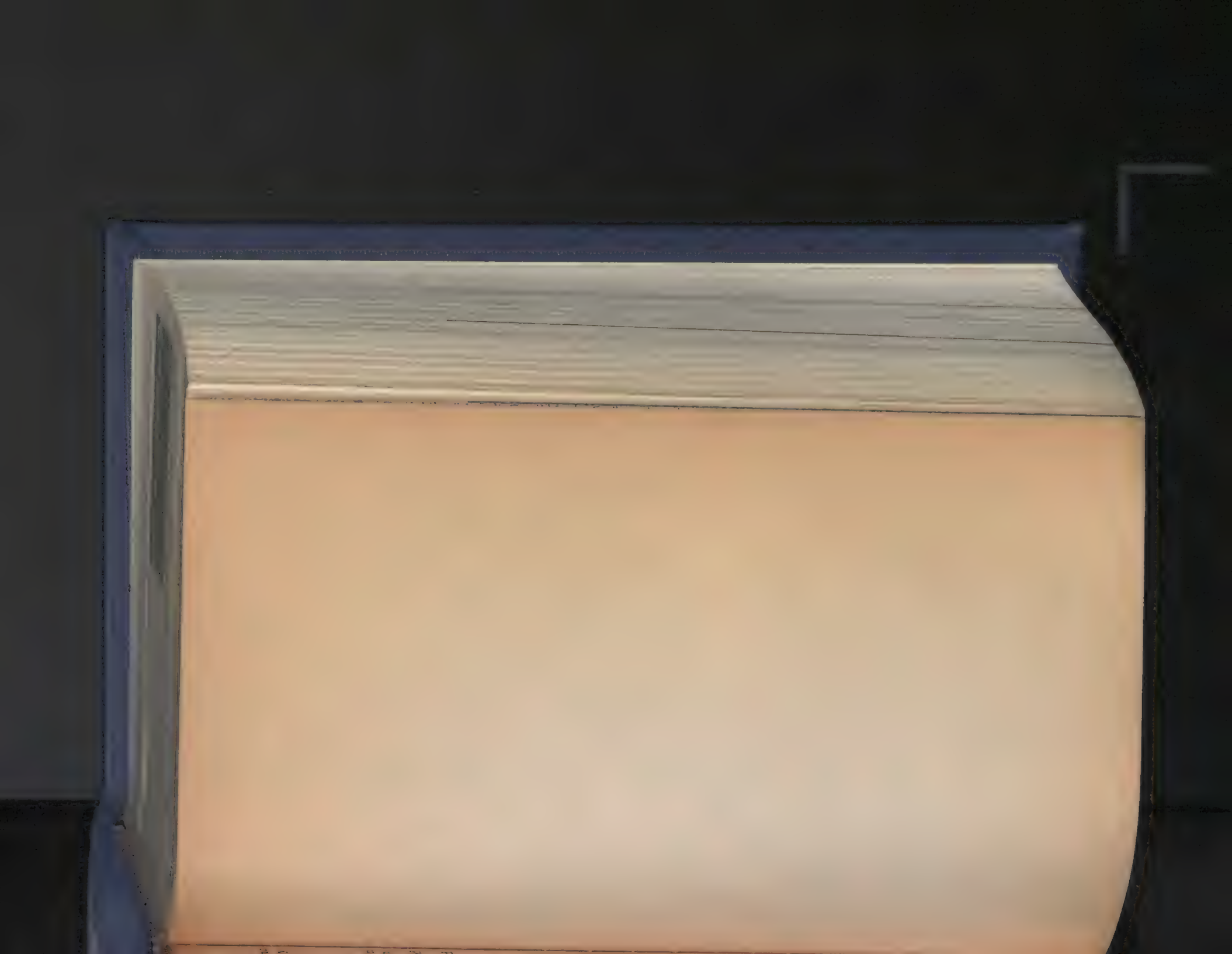
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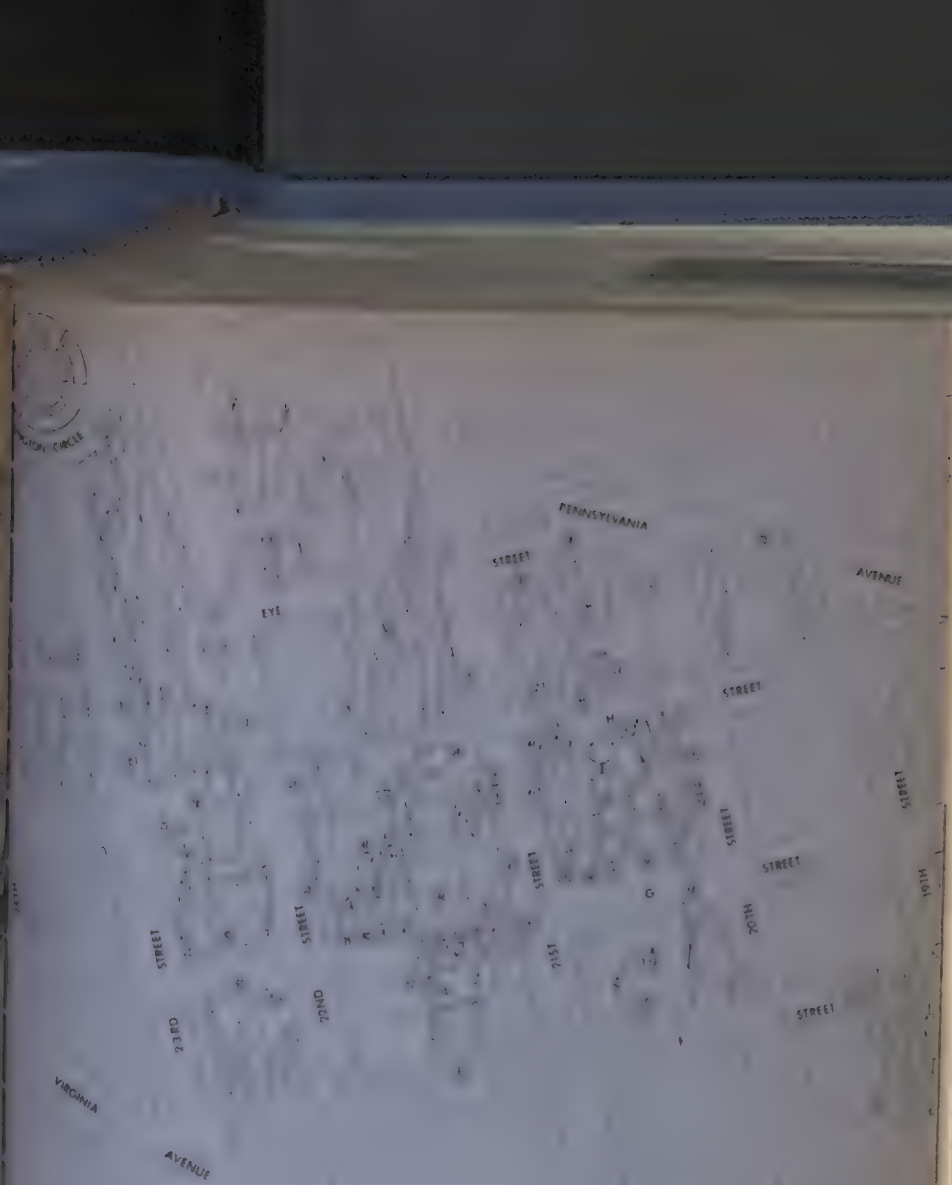
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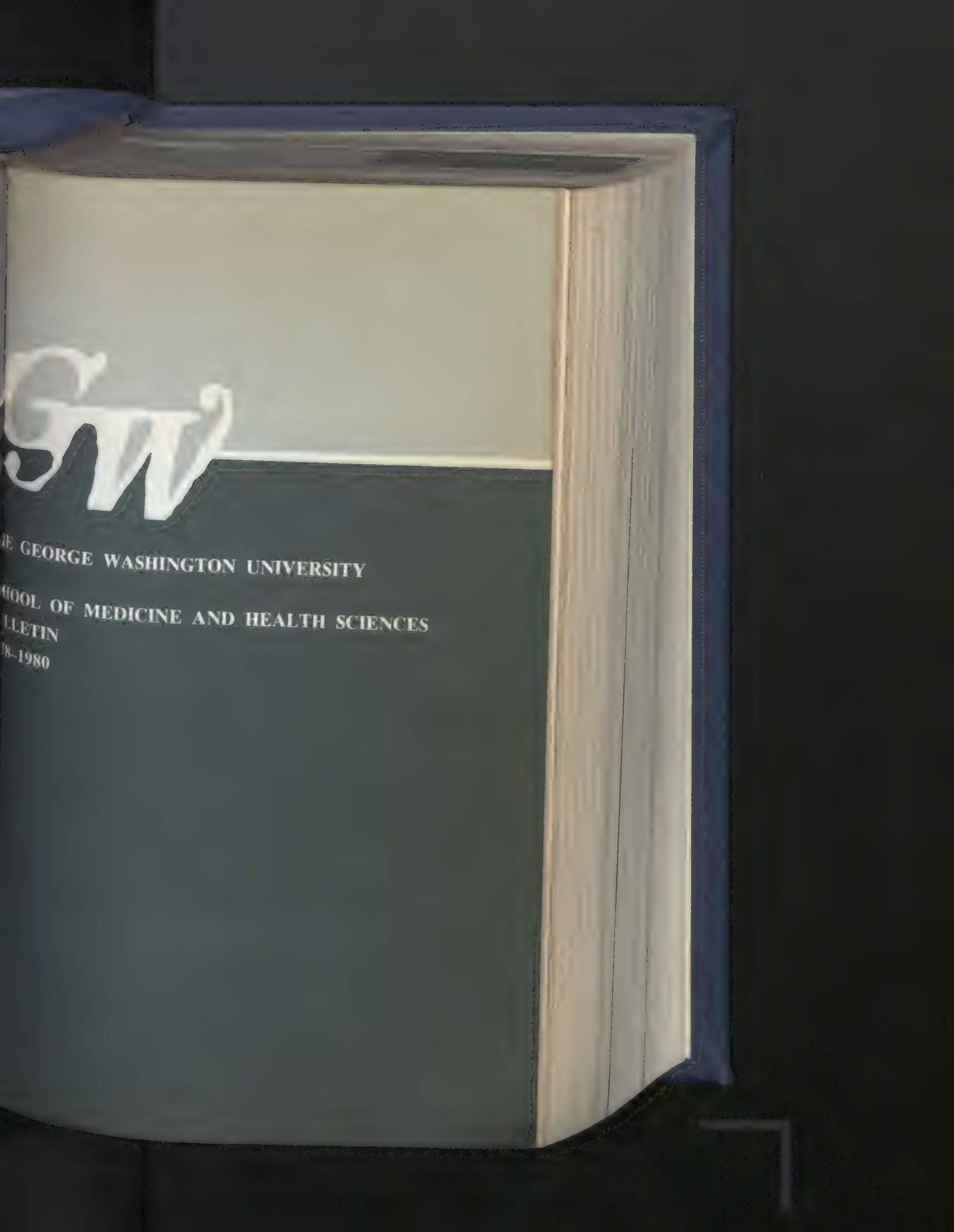
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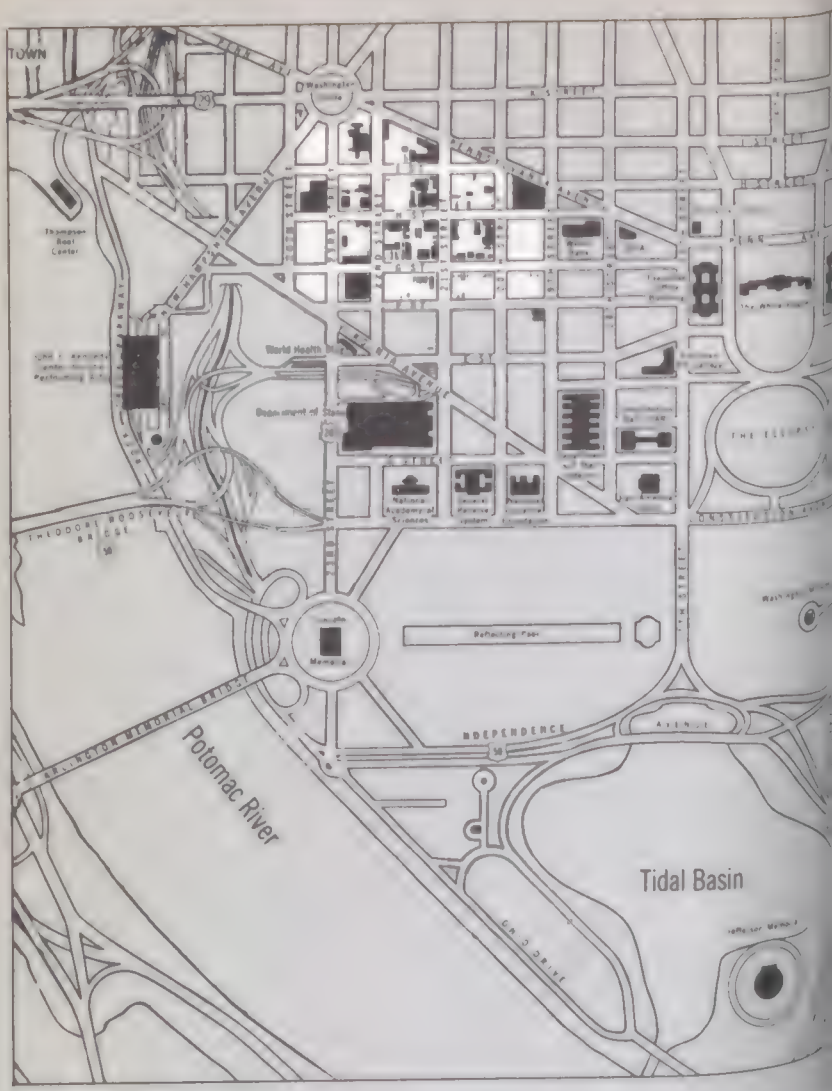






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December, 1978

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THE GEORGE WASHINGTON UNIVERSITY

SCHOOL OF MEDICINE AND HEALTH SCIENCES BULLETIN

1978–1980

Washington, D.C. 20037

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August 23–25	Orientation, *Wednesday–Friday*
August 28	Registration, *Monday*
August 29	First day of classes, *Tuesday*
September 4	Labor Day—holiday for first- and second-year students, *Monday*
November 22	Thanksgiving vacation begins after classes for first- and second-year students, *Wednesday*
November 27	Return from vacation, *Monday*
December 15	Winter vacation begins after classes, *Friday*
January 3	Classes resume, *Wednesday*
January 9	Spring Registration, *Tuesday*
February 19	Washington's Birthday—holiday for first- and second-year students, *Monday*
March 23	Spring break begins after classes for first- and second-year students, *Friday*
April 2	Return to classes, *Monday*
April 20	Spring break begins for third-year students at 5:00 p.m., *Friday*
April 30	Third-year students begin clerkship, *Monday*
May 18	Last day of classes, *Friday*
May 21–25	Examination period, *Monday–Friday*
May 25	Commencement, *Friday*
August 17	End of third-year clerkships, *Friday*

* This Calendar is subject to change. Although registration is conducted in both August and January, there is no precise date for the end of the fall semester; some courses end before the winter recess while others begin before the January registration. Dates for the 1978–80 academic year will correspond approximately to dates given here; more precise information will be available in January, 1979.

THE UNIVERSITY

HISTORY AND ORGANIZATION

The George Washington University had its beginning in 1821 as The Columbian College in the District of Columbia. The name of the institution was changed in 1873 to Columbian University and in 1904 to The George Washington University. The debt of the University to George Washington, whose name it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted upon the establishment of a national university in the federal city. There he hoped that, while being instructed in the arts and sciences, students from all parts of the country would acquire the habits of good citizenship, throwing off local prejudices and gaining at first hand a knowledge of the practice, as well as the theory, of republican government. To further the materialization of his hopes, Washington left a bequest of fifty shares of The Potomac Company "towards the endowment of a University to be established within the limits of the District of Columbia, under the auspices of the General Government, if that government should incline to extend a fostering hand towards it." The Congress never extended "a fostering hand." The Potomac Company passed out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great missionary urge and the need for a learned clergy, a group of dedicated ministers and laymen sponsored a movement for the establishment of a college in the District of Columbia. Inspired largely by the zeal and energy of the Reverend Luther Rice, they raised funds for the purchase of a site and petitioned Congress for a charter. After much delay and amendment, Congress granted a charter which was approved by President Monroe on February 9, 1821. To safeguard the College's nonsectarian character it provided "That persons of every religious denomination shall be capable of being elected Trustees; nor shall any person, either as President, Professor, Tutor or pupil, be refused admittance into said College, or denied any of the privileges, immunities, or advantages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, its activities were centered on College Hill, a tract of forty-six and a half acres between the present Fourteenth and Fifteenth Streets extending north from Florida Avenue somewhat beyond Columbia Road. The Medical School was located downtown. For the better part of the Columbian University period,

the buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. Within a few blocks are the White House, the Department of the Interior, the State Department, the World Bank, and many other governmental offices and international agencies. The area has many reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for 50 years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, and Public and International Affairs; the College of General Studies; the Division of University Students; the Division of Experimental Programs; and the Summer Sessions.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an *ex officio* member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board. The Department of Chemistry is on the approved list of the American Chemical Society.

The School of Medicine and Health Sciences has had continuous approval by the Council on Medical Education of the American Medical Association and the Association of American Medical Colleges. The Doctor of Medicine degree of the School of Medicine and Health Sciences is recognized by all state and territorial medical licensure boards in the United States.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

George Washington University does not discriminate against any person on the basis of sex, race, color, religion, national origin, or handicap in any of its education programs or activities. Federal regulations implementing Title IX of the Education Amendments of 1972 and Section 504 of the Rehabilitation Act of 1973 call for an explicit statement that the requirement not to discriminate on the basis of sex or handicap extends to employment in and admission to such programs and activities. The University is also subject to the District of Columbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and regulations concerning discrimination in education or employment programs and activities may be addressed to Marianne Phelps, Assistant Provost for Affirmative Action, Rice Hall, Washington, D.C. 20052, or to the Director of the Office for Civil Rights of the Department of Health, Education, and Welfare.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the Departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representative of all elements of the University community, plays an important role in the day-to-day functioning of the center. This board works closely with the full-time staff in the development of procedures and policies which provide a framework for the center's operation.

RECREATION

The nation's capital provides abundant recreational resources, a large number of which are available at little or no cost. There are numerous art galleries, museums, concert halls, theaters, swimming pools, parks, and places of great historic interest. Social activities are provided by student organizations of the University, the School of Medicine and Health Sciences, and University-sponsored programs such as intramural sports, concerts, recitals, and dramatic productions. Religious faiths are well-represented in the Washington metropolitan area. Washington is one of the most colorful cultural and scientific centers of the world.

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Robert Gebhardtsbauer, M.A., *Registrar*



THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

OFFICERS OF ADMINISTRATION OF THE MEDICAL CENTER

Ronald Paul Kaufman, B.S., M.D., *Vice President for Medical Affairs and Executive Dean of the Medical Center*

Office of Academic Affairs

The Office of Academic Affairs bears the responsibility for the curriculum; student affairs, including scholarship and financial aid; research and sponsored programs; allied health programs; educational evaluation; admissions; and support services of the library and audio-visual and animal facilities.

Lawrence Thompson Bowles, M.D., Ph.D., *Dean for Academic Affairs*
Fred Leonard, Ph.D., *Associate Dean for Research*
Robert Keimowitz, M.S., M.D., *Associate Dean for Student Affairs and Admissions*
Winfield Harker Scott, Ph.D., *Associate Dean for Education and Director of Education*

Office of Administrative Affairs

The Office of Administrative Affairs is responsible for the administration of the University Hospital and Clinic, for support services to the School of Medicine and Health Sciences, and for the financial management of the Medical Center.

Philip Stanley Birnbaum, M.S. in M.E., B.C.E., *Dean for Administrative Affairs*
Thomas James Carroll, B.A., *Director of Financial Services*
Bruce Johnson Dietz, B.A., M.S., *Director of Management Information*

Office of Clinical Affairs

The Office of Clinical Affairs is responsible for the patient care activities of the University Hospital and Clinic and for the supervision of the graduate and continuing medical education programs and community affiliation programs.

Dennis Sophian O'Leary, B.A., M.D., *Dean for Clinical Affairs*
Sheila McCarthy, B.S.N., *Director of Nursing*
Robert James Van Houten, B.S., M.D., *Associate Dean for Graduate and Continuing Medical Education*

HISTORY

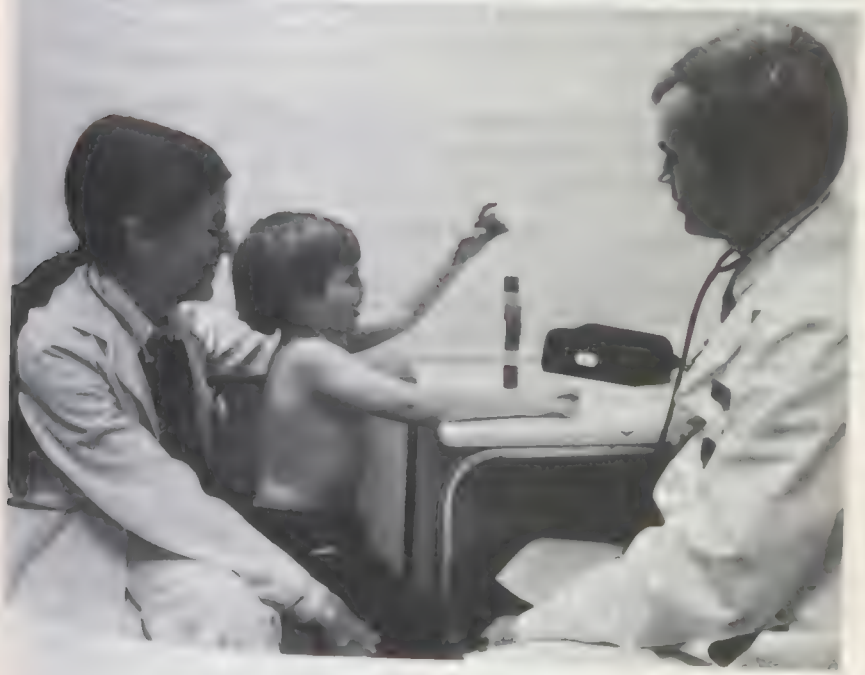
The School of Medicine and Health Sciences of George Washington University has a distinguished history that goes back more than a century. In March, 1825, the School opened with the intention of building "a medical school commensurate with the progress and demands of a rising metropolis, and the improvement of service throughout the country." The School, the eleventh oldest medical school in the country, has met this responsibility by providing its students with a foundation in the medical sciences upon which they have built medical careers in practice, teaching, research, or administration.

In 1844 the School took on a new dimension when Congress granted it the use of the Washington Infirmary. Thus one of the earliest general teaching hospitals in the nation was established in Washington.

The distinguished history of the George Washington University School of Medicine and Health Sciences closely parallels academic advances and medical progress of the nation. The School has contributed to both.

The George Washington University Medical Center, established in 1966, consists of Walter G. Ross Hall, which houses the School of Medicine and Health Sciences; the Paul Himmelfarb Health Sciences Library; the University Hospital; the H.B. Burns Memorial Building, which houses the Medical Faculty Associates (the University Clinic); the Helen L. and Mary E. Warwick Memorial Building; and affiliated hospitals.

In 1973, with the introduction of undergraduate programs in Allied Health Sciences, the name of the School was officially changed from the School of Medicine to the School of Medicine and Health Sciences.



Regulations

A student enrolled in the University is required to conform to the following regulations and to comply with the rules and regulations of the college, school, or division in which he or she is registered.

A student who withdraws or is suspended, or is otherwise absent from the University for one semester or more, may re-enter and continue scholastic work only under the regulations and requirements in force at the time of return.

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, the student's registration may be cancelled. If such falsification is discovered after the student has established an academic record at the University, the student may be subject to dismissal from the University. Such a student will be ineligible (except by special action of the Faculty) for subsequent registration in the University.

Academic Dishonesty

The University community, to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of, all proper procedures for doing research, writing papers, and taking examinations.

Members of the community will be presumed to be familiar with the proper academic procedures and are held responsible for applying them. Deliberate failure to act in accordance with such procedures will be considered academic dishonesty. Acts of academic dishonesty are a legal, moral, and intellectual offense against the community and will be prosecuted through the proper university channels.

Copies of the University policy on academic dishonesty can be obtained from the following offices: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

University Policy on the Release of Student Information

The Family Educational Rights and Privacy Act of 1974 applies to institutional policies governing access to and release of student education records maintained by educational institutions which are recipients of Federal funds. The University complies with this statute, which states, in part, that such institutions must

1. afford students access to education records directly related to them;
2. offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate; and
3. receive the student's written consent before releasing information from his or her education records to persons outside the University, except for directory information as indicated below. Information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency; and
4. comply with a judicial order or lawfully issued subpoena to release a student's record, notifying the student of this action.

The University will release the following directory information upon request: name, local address, and telephone number; name and address of next of kin; dates of attendance; school, college, or division of enrollment; field of study; credit hours earned; degrees earned; honors received; participation in organizations and activities chartered or otherwise established by the University (including intercollegiate athletics); and height and weight of members of athletic teams. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

Copies of the University's full policy statement on the release of student information may be obtained from the Office of the Registrar.

Right to Dismiss Students

The right is reserved by the University to dismiss or exclude any student from the University, or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

Right to Change Rules

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules and fees. Such regulations shall go into force whenever the proper authorities may determine.

Right to Make Changes in Programs

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

Student Conduct

All students upon enrolling and while attending The George Washington University are subject to the provisions of the *Statement of Student Rights and Responsibilities* which outlines student freedoms and responsibilities of conduct, the Judicial System for Non-Academic Student Discipline, and other policies and regulations as adopted and promulgated by appropriate University authorities. Copies of these documents may be obtained at the Office of the Vice President for Student Affairs. Sanctions for violation of these regulations may include permanent expulsion from the University which may make enrollment in another college or university difficult. Regulations or requirements applicable only to a particular program, facility, or class of students may not be published generally, but such regulations or requirements shall be published in a manner reasonably calculated to inform affected students.

University Policy on Drugs

The University cannot condone violations of law, including violation of those laws which proscribe possession, use, sale, or distribution of drugs. Members of the academic community should know that administrative action, which may include dismissal from the residence halls, revocation of other privileges, or suspension or dismissal from the University, may be taken in order to protect the interests of the University and the rights of others.

The Libraries

Students have the privilege of using the University Library and the School of Medicine and Health Sciences Library. The stacks are open, and all students are welcome to browse at their leisure. A card denoting approved enrollment for the current semester must be presented when books are borrowed for outside use.

All students using the libraries are expected to be familiar with the regulations governing their use, which are available at each library.

Property Responsibility

The University is not responsible for the loss of personal property. A "Lost and Found" Office is maintained on campus in the Safety and Security Office.

Student Affairs

The Office of the Vice President for Student Affairs develops student life programs, policies, and procedures to complement the University's formal instruction program. These activities are implemented through the offices of the Cloyd Heck Marvin Center, Counseling Center, Dean of Students, Educational Opportunity Program, Housing, International Students, Student Activities, Student and Alumni Career Services and Student Health Service. More detailed information on these and other activities is contained in the *Student Handbook*.

Student Health Service

The Student Health Service is an outpatient clinic designed to assist students registered on campus with their health needs. It is located at 935 22nd St., N.W. (in the H.B. Burns Memorial Building).

Physicians and physician assistants are available by appointment from 9 a.m. to 4:45 p.m., Monday through Friday. In addition, physician assistants are available for emergency care to walk-in patients Monday through Friday from 5 to 6:45 p.m. and on Saturday from 9 a.m. to 12 noon.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to receive treatment at the Student Health Service. A student who is not currently enrolled or who has severed connection with the University is ineligible for medical benefits of the Student Health Service. Any student who so desires may engage physicians and nurses of his or her own choice, but the student will be responsible for all the fees charged. The bills incurred from all services rendered outside of the Student Health Service (for example, x-ray work, laboratories and referrals to specialists or other outside physicians) are the responsibility of the student.

Health and Accident Insurance

The Student Health Service has arranged for and endorsed group health and accident insurance, on an elective basis, for those full-time students who do not

have other coverage. Students are encouraged to carry adequate health insurance coverage for themselves and, if married, for their spouses and children. Interested students should contact the Student Health Service Office.

Residence Halls

Complete information concerning the University's residence halls is available from the Director of Housing, George Washington University, Washington, D.C. 20052. Information concerning off-campus housing may be obtained at this Office and at the Office of the Dean for Academic Affairs. Reservations for private housing must be made by students.

Munson Hall Apartments

Munson Hall is a University owned and operated apartment house containing 15 one-bedroom and 54 efficiency apartments. Graduate and married students are eligible to reside in Munson Hall. Those wishing to apply for an apartment should contact the Housing Office for a waiting list application. All leases are for 12 months.

Milton and Guthridge Apartments

These apartment houses are University owned, commercially operated buildings within the campus area. Each building contains efficiency and one-bedroom units which are rented only to full-time graduate students on an "as available" basis. Referrals to the resident managers of these buildings are made by the Director of Housing when notice is received of vacancies. Leases are executed with the respective management companies and are on a month-to-month basis.

Housing for Undergraduate Allied Health Students

Admission to the University does not include a room reservation. The student will receive, with notification of acceptance, University residence hall information, an application for residence hall space and a declaration of intent to attend the University. The application for residence hall space must be accompanied by a $100 *nonrefundable deposit*. The housing deposit is credited toward the first semester's room charge. Rooms are leased for the academic year, September to May, and lease payment must be made in June for the fall semester. Physician assistant and nurse practitioner applicants are not encouraged to apply for University housing in view of their extended academic year.

1978–79 RESIDENCE HALL RATES PER PERSON FOR TWO SEMESTERS*

For Men:

Calhoun Hall	
double room	$1,216
triple room	1,160

* Residence hall prices and allocation subject to change. The rates for 1979-80 will be increased over those shown for 1978-79. Every effort will be made to keep the increase as small as possible consonant with prudent financial management.

For Women:

Strong Hall	
single room	1,268
double room	1,216
triple room	1,134

For Men and Women:

Crawford Hall (limited to sophomores, juniors, and seniors)—	
double room	1,216
Francis Scott Key Hall (limited to juniors and seniors)—	
apartment for two persons	1,296
apartment for three persons	1,296 or 1,242
Mitchell Hall (limited to sophomores, juniors, and seniors)—	
single room	1,296
Madison Hall	
double room	1,216
triple room	1,134
Thurston Hall	
double room, triple room, large room for four	1,216
suite for six, small room for four	1,134

FOOD SERVICE*

Resident allied health students in the freshman and sophomore years are required to participate in the food service plan. Freshmen must participate in the seven-day, 19 meals per week plan, at the rate of $874* for the academic year. Sophomores may elect either the 19-meal plan or any 14 meals per week plan for $822* for the academic year. Each plan, plus an additional "any 10 meals" per week plan at $710* for the academic year, is optional for junior, senior and graduate students. Food service payment does not cover University intersession or vacation periods. All meal cards admit bearer to dining rooms in Thurston and Mitchell Halls and to the second-floor contract dining room in the Cloyd Heck Marvin Center. Meal cards may also be used on a cash equivalency basis in the Marvin Center first-floor cafeteria and Rathskeller.

Students who observe the Jewish dietary laws can write to make arrangements with the George Washington University Housing Office regarding the B'nai B'rith Hillel Foundation Kosher Meal Plan.

Veterans Benefits

The veterans counselor's office, on the fifth floor of Rice Hall, 2121 Eye St. N.W., assists students entitled to educational benefits as veterans or as widows or children of deceased or totally disabled veterans with any problems which may arise concerning their benefits. This Office also processes certification of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

* Food service prices subject to change. The rates for 1979–80 will be increased over those given for 1978–79. Every effort will be made to keep the increase as small as possible consonant with prudent financial management.

When feasible, students entitled to benefits as veterans or dependents of veterans should consult with the veterans counselor prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., Washington, D.C. 20421.

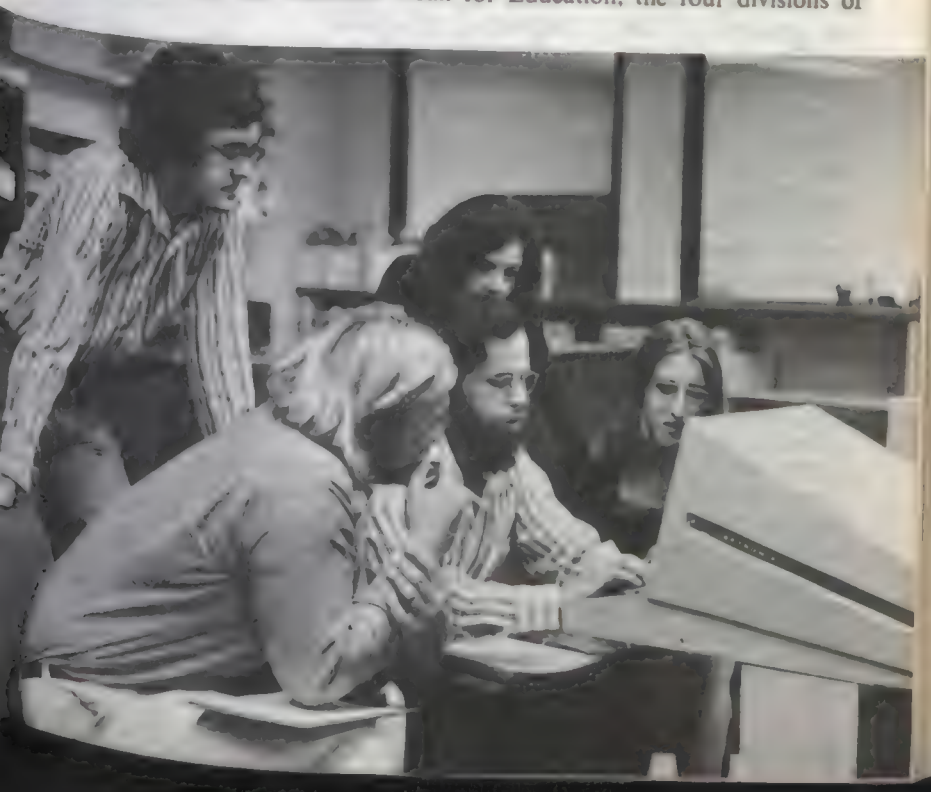
Facilities

Walter G. Ross Hall

Walter G. Ross Hall was dedicated and opened in 1973. This modern facility provides the teaching and laboratory facilities for students in the School of Medicine and Health Sciences. It occupies a city block on the northwest edge of the University campus; its gross area is approximately 550,000 square feet, or more than 10 acres. The building is equipped with modern audio-visual and other teaching equipment as well as basic science laboratories.

Office of Education

The Office of Education comprises a group of core facilities and services supportive of the educational, clinical, and research missions of the Medical Center. Coordinated through the Associate Dean for Education, the four divisions of



the Office of Education are the Office of Audiovisual Education, the Office of Academic Computer Services, the Division for Evaluational Services, and the Paul Himmelfarb Health Sciences Library.

The Office of Audiovisual Education and Services, Frank Allen, Ph.D., Director.—This office aims to enhance learning in the Medical Center with audiovisual technology. Consultation is provided in the use of nonprint media in educational, clinical and research programs. The office provides displays of audiovisual materials and programs in classrooms, in the Audiovisual Study Center of the Himmelfarb Library and throughout the Medical Center. It has highly developed production capabilities which are available to students and faculty. They include photographic, illustration, cinematographic and television studios, and a print shop which serve the Medical Center community. Virtually all learning spaces at the Medical Center are equipped for still and motion projection and television display. Those spaces subject to frequent use are equipped with permanent systems for projection, sound amplification and recording designed to support staff and student presentations.

Office of Academic Computer Services, F. Helmuth Orthner, Ph.D., Director.—This office provides training in computer literacy and delivery of computer-based learning materials. Other services include scoring of examinations, maintenance of academic records, computing in support of research projects, data acquisition, statistical analysis and text processing. The office maintains hardware and software support for computer-based learning materials developed by faculty and students of the Medical Center. It functions as an interface for the delivery of material from other computer-assisted educational programs—notably Massachusetts General Hospital and Ohio State University—through the Health Educational Network, Inc. Cooperative programs with the National Institutes of Health and the National Library of Medicine provide access to additional computerized data bases.

Division for Evaluational Services, Winfield Scott, Ph.D., Director.—The primary task of this division is to work with faculty and students toward the improvement of educational programs. It provides consultation to faculty in support of efforts to maximize opportunities for learning. It conducts evaluations of courses and other curriculum components and works toward the establishment of effective systems for evaluating student performance.

Paul Himmelfarb Health Sciences Library, Nina W. Matheson, Director.—Located adjacent to Ross Hall, the Paul Himmelfarb Health Sciences Library provides 30,000 square feet to house a capacity of 80,000 volumes. Seating is available to approximately 400 users. Space available includes smoking lounges, group study rooms, audiovisual viewing rooms, a typing room and individual study carrels. The Audiovisual Study Center is equipped with the most recent and up-to-date resources and facilities, including videotape monitors, terminals for accessing computer-aided instructional programs, slide-tape recorders and rear-view slide projection units. The collection of more than 60,000 volumes and 1,400 journal subscriptions is enhanced by extensive nonprint audiovisual media which are both commercially and locally produced. Together these provide the foundation for the delivery of a number of special information services. The Network for Continuing Medical Education program provides loans of videotapes to individuals who cannot attend the regularly scheduled viewings. As a designated National Library of Medicine Medline Center, the library offers computer-based bibliographic research services such as Medline, Toxline and Cancerline. Staff may request monthly selected

dissemination of information searches from this data base. Search capability on other data bases such as Science Citation Index, Psychological Abstracts and Biological Abstracts are being implemented. Materials not available in its own collection will be borrowed to meet user needs.

Through both formal and informal means, the library staff instructs its clientele on the effective use of materials and services. An active participant in the National Library of Medicine's Regional Library Communications Network, the library is involved in regional planning and policy making.

The George Washington University Hospital

This 550-bed hospital, including the Eugene Meyer Pavilion and the Harry F. Duncan Pavilion, is adjacent to the School of Medicine and Health Sciences. It is the primary clinical teaching facility for the students and for a large house staff. It is fully approved and accredited by the American Medical Association, the American Hospital Association, the American College of Physicians, and the American College of Surgeons, through the Joint Commission for the Accreditation of Hospitals. Annual patient admissions number approximately 20,000.

The Watson Wise Emergency Pavilion of the hospital logs approximately 40,000 patient visits annually and is one of the city's most active emergency units.

The University Hospital is equipped to serve 16 specialty fields. Complex teamwork procedures such as renal dialysis, a computerized x-ray unit for diagnosing brain diseases, cardiac catheterization, open-heart surgery, transplant surgery, and total hip replacements are included in its activities. Facilities include a surgical suite of 10 rooms, two of which are equipped with overhead galleries where observers may communicate with the surgical teams, observe the electronic patient-monitoring system in action, and view the intricate surgical procedures below.

The Helen L. and Mary E. Warwick Memorial Building

This building houses a computerized multitest facility that is available to physicians for patient evaluation.

The Medical Faculty Associates (The University Clinic)

The Clinic is housed in the 13-story H.B. Burns Memorial Building, where ambulatory care is consolidated and integrated within the teaching program. The academic group practice of physicians in general medicine and more than 20 specialists is based in the Burns Building. Visits of ambulatory patients number approximately 90,000 annually.

Affiliated Hospitals

Children's Hospital National Medical Center.—Children's, one of the finest pediatric health care centers in the country, houses 220 inpatient beds, including a specialized referral intensive care nursery and an adolescent unit. Its ambulatory Diagnostic and Treatment Center handles in excess of 120,000 visits a year. Children's is the major base for the School of Medicine and Health

Science's Department of Child Health and Development, and for the assigne pediatric clerkship. A variety of elective opportunities are offered in variou aspects of child health.

Columbia Hospital for Women.—This hospital, situated two blocks from th University Hospital, is utilized by medical students for training in obstetrics an gynecology. Columbia Hospital for Women is an affiliated hospital for res dency training in Obstetrics and Gynecology in the George Washington Univer sity Medical Center Program.

Fairfax Hospital.—This 530-bed voluntary community teaching hospita serves a burgeoning surburban area and provides all clinical services includin psychiatry. Each year more than 20,600 patients are admitted, 4,900 babies de livered, 15,000 surgical operations performed, and 49,200 persons examined an treated in the Emergency Suite. Fairfax Hospital offers a rotating internshi program, a School of Medical Technology, and clinical facilities for a School o Practical Nursing. Students of the School of Medicine and Health Science serve at this hospital in clinical clerkship and elective programs. Fairfax Hos pital is an affiliated hospital for residency training in Obstetrics and Gynecology in the George Washington University Medical Center Program.

Holy Cross Hospital.—Holy Cross, a modern 338-bed hospital, is a primary clinical campus which provides students with first-hand exposure to the practice of medicine in the community. It is a private, voluntary facility in which the full range of medical, surgical, and pediatric services are provided for a grow ing suburban population. Last year, more than 19,000 patients were hospitali ized, nearly 47,000 emergency visits were registered, and 3,263 babies were de livered at Holy Cross. The hospital, which has consistently experienced one of the highest occupancy rates in the Washington metropolitan area, is planning an expansion to include an additional 112 beds, enlarged emergency room facili ties, and a new, self-contained center for in-and-out surgery.

National Naval Medical Center.—The Naval Hospital at the National Naval Medical Center, Bethesda, Md., is a 750-bed general hospital offering a wide range of specialized services, clinical research, and educational programs. Medical care is provided to active duty and retired military members and their dependents. It is a major referral center for thoracic and cardiovascular sur gery as well as for cancer therapy. The teaching staff directs a complete intern ship and residency program in 21 specialties.

St. Elizabeths Hospital.—St. Elizabeths Hospital, established by an act of Congress in 1855, is a federal psychiatric hospital administered under the De partment of Health, Education, and Welfare. This hospital provides for the treatment, care, and general well-being of approximately 6,000 patients of whom 3,400 are resident. The facility includes a completely approved General Hospital to meet the needs for medical and surgical care and functions with a full-time staff within the hospital plus attending physicians in various specialties. The hospital maintains an up-to-date medical library.

Medical students of George Washington University utilize the facilities of St. Elizabeths for clinical psychiatric training. Opportunities for research are enhanced by a cooperative arrangement with the National Institute of Mental Health of the United States Public Health Service.

Veterans Administration Hospital.—In addition to the medical, surgical, psy chiatric, neurological, tubercular, and physical medicine and rehabilitation serv ices, this 700-bed hospital has a large outpatient program; an extensive medical research program; programs in open heart surgery, cobalt therapy, and ren

dialysis; a metabolic program; and a specially designed Administrative Research Laboratory.

Washington Hospital Center.—This 843-bed private, voluntary institution serves the greater Washington area through a triad of activities: patient care, teaching, and research. The Center is the tenth busiest of more than 7,000 hospitals in the United States and the second busiest private hospital in terms of inpatient admissions. A very active emergency service cares for more than 49,000 patients a year, and the 50 clinics provide all major clinical service except pediatrics for about 65,400 outpatients and 31,700 inpatients yearly. In addition to an extensive approved internship and residency program, the Center offers organized instruction for nurses, laboratory and x-ray technicians, medical secretaries, and other health-related vocations.

Committees 1977-78

ACADEMIC FREEDOM AND ETHICS

M.L. Elgart *(Chairman)*, R.W. Bryant, Jr., S.G. Kent, R.J. Lewis, S.D. Loube, T.G. Webster, H.D. Weintraub

ADMISSIONS AND ADVANCED STANDING

I.C. LaRosa *(Chairman)*, F.H. Anderson, C.U. Battle, L.T. Bowles *(ex officio)*, E. Brettholtz *(3rd-year medical student)*, F.C. Green, J. Horn *(4th-year medical student)*, R.I. Keimowitz, P.D. Kind, R. Lewis *(2nd-year medical student)*, R.J. Neviaser, A. Segal, B. Waxman

ALLIED HEALTH PROGRAMS

G.L. Walker *(Chairman)*, C.U. Battle, R.B. Beck, P.S. Birnbaum, L.T. Bowles *(ex officio)*, S.S. Hammersberg, K.R. Katterjohn, P. Mazel, J.W. Millar, U.E. Ruttimann, M. Silverman, W.A. Stein, I.G. Tamagna, D.W. Watkins, J.M. Wise

APPOINTMENTS, PROMOTION AND TENURE

P.E. Shorb, Jr. *(Chairman)*, F.P. Abramson, A. Breslow, D.O. Davis, N.C. Kramer, C.A. Rigg, H.M. Silver

BYLAWS

B. Nelson *(Chairman)*, R.A. Kenney, A.E. Parrish, R.H. Parrott, J.J. Rheingold, W.S. Yamamoto *(ex officio)*

COMMUNICATIONS AND EDUCATIONAL RESOURCES

E. Waters, Jr. *(Chairman)*, Y. Al-Doory, F.D. Allan, L.T. Bowles *(ex officio)*, K.R. Katterjohn, R.A. Lavine, E.J. Lieberman, N.W. Matheson, F.H. Orthner, R.H. Parrott, M.L. Robbins, W.H. Scott, K.L. Weaver, W.S. Yamamoto

CONTINUING MEDICAL EDUCATION

L.W. Thompson *(Chairman)*, F.D. Allan, R.W. Althoff, A. Baer, W.H. Coope
R.P. Jacobs, H.G. Mandel, A.M. Margileth, W. Marsh, A.M. Mondzac, R.
Nicklas, D.S. O'Leary *(ex officio)*, J.J. Rheingold, C.C. Rogers, R. Scaletta
H. Stevens, R.J. Van Houten

EDUCATIONAL EVALUATION

R.S. Snell *(Chairman)*, D.C.T. Choate, M.W. Dennis, J.B. Ermann, B.L. Fran
el, L.L. Gallo, A.P. Guarinello, S.S. Haas, D.O. Hindman *(2nd-year medic*
student), R.I. Keimowitz, R.A. Kenney, P. Klubes, A.M. Kwart, J.R. Ludg
(3rd-year medical student), F.N. Miller, A.E. Parrish, S.J. Scott, Jr., W.H
Scott, B.W. Smith, G.A. Taylor *(4th-year medical student)*, R.S. Wilkinson

EDUCATIONAL PLANNING

L.S. Lessin *(Chairman)*, L.F. Affronti, G.B. Avery, P.S. Birnbaum, L.T
Bowles *(ex officio)*, M.M. Cassidy, F. Chucker, A.A. deMoya, O.W. Donnelly
M. Enders, J.B. Erdmann, S.E. Fabro, B.E. Filner, R.J. Friedman *(4th-yea*
medical student), D.R. Glick *(2nd-year medical student)*, D. Hunter *(1st-yea*
medical student), H. Jason, R.I. Keimowitz, P.I. Kenmore, M.J. Koering, H.C
Miller, Jr., G.F. Molinari, M.D. Parkinson *(3rd-year medical student)*, L.G
Pawlson, D. Reiss, W.H. Scott, H. Sidransky, C. Spiegel, J.A. Straw, N.T
Tsangaris, G.A. Walker, T.G. Webster, P. Witorch, A.C. Wyman, W.S. Yama
moto

EXECUTIVE COMMITTEE OF THE MEDICAL CENTER FACULTY SENATE

A.B. Weingold *(Chairman)*, E. Adelson, W.O. Dobbins III, R.P. Kaufman *(ex*
officio), R.A. Kenney, B.W. Smith

GRADUATE MEDICAL EDUCATION

H.D. Weintraub *(Chairman)*, M.F. Armaly, P.E. Chanel, D.W. Delaney, M.L
Elgart, P.B. Holly, R.P. Jacobs, F.S. Jannotta, R.I. Keimowitz, L. Makine
(medical student body), H.G. Mandel, J.A. McCormick, H.C. Miller, Jr., G.F
Molinari, R.J. Neviaser, D.S. O'Leary *(ex officio)*, M. Parker, L.G. Pawlson
S. Perlin, W.H. Scott, P.E. Shorb, Jr., L.W. Thompson, R.J. Van Houten
B. Waxman, A.C. Wyman

LONG RANGE PLANNING

M.L. Elgart *(Chairman)*, P.S. Birnbaum *(ex officio)*, L.T. Bowles *(ex officio)*
R.W. Bryant, Jr., R.P. Kaufman *(ex officio)*, S.G. Kent, S.D. Loube, D.S
O'Leary *(ex officio)*, R.J. Randall, T.G. Webster, H.D. Weintraub

MEDICAL SCIENCES GRADUATE PROGRAMS

V.H. Cohn, Jr. *(Chairman)*, J.M. Bailey, S. Bloom, L.T. Bowles *(ex officio)*
M.M. Cassidy, W.C. Eckelman, S.J. Feinmark *(Biochemistry student)*, M.

Koering, J.B. Levy, M. Reich, L.S. Samuels *(Pharmacology student)*, S.O. Schiff, H. Solomon *(ex officio)*

PUBLIC RELATIONS

H.C. Miller, Jr. *(Chairman)*, D. Beckom *(student representative)*, P.S. Birnbaum *(ex officio)*, L.L. Gallo, W.K. Lukash, P. Mazel, D. Parkinson, E. Waters, Jr.

RESEARCH

M.F. Armaly *(Chairman)*, E.N. Albert, L.T. Bowles *(ex officio)*, E.W. Bradley, V.H. Cohn, Jr., W.P. Fortune, M. Frank, G.W. Geelhoed, A.L. Ginsberg, A.C. Hollinshead, S.G. Kent, J.W. Larsen, Jr., D.S. Lee, F. Leonard, G.F. Molinari, H.F. Orthner, M. Reich, P.M. Rothenberg *(Beaumont Society student)*, M.J. Stern, C.R. Treadwell, S. J. Wolin, B.C. Zook

SPACE AND FACILITIES

M.J. Jackson *(Chairman)*, F.P. Abramson, E.N. Albert, P.S. Birnbaum *(ex officio)*, L.T. Bowles *(ex officio)*, R.W. Bryant, Jr., W.C. Eckelman, C.R. Garrett, K. Goldstein, R.I. Keimowitz, P.D. Kind, F. Leonard *(4th year medical student)*, A.E. Parrish, P.J. Steinglass, 3rd-year medical student, 2nd-year medical student, 1st-year medical student

STUDENT AFFAIRS

N.T. Tsangaris *(Chairman)*, R.J. Anderson, L.T. Bowles *(ex officio)*, C.M. Farr *(2nd-year class president)*, M. Fuchs, M. Gusack, F.K. Harris II, K.Y. Huang, R.I. Keimowitz, F.S. Martin *(1st-year class president)*, J.E. McClenathan, Y.C. Oertel, R.H. Parrott, D.S. Rigel *(4th-year class president)*, W.R. Roberts *(3rd-year class president)*, W.H. Scott, A.M.S. Thompson, M.E. Tidball, R.S. Wilkinson, J.M. Wise

Alumni and Allied Associations

THE GENERAL ALUMNI ASSOCIATION

The objectives of this association are to unite graduates who wish to associate themselves for charitable, educational, literary, and scientific purposes, and to promote the general welfare of the University.

Eligible members are those who have matriculated in any school of the University and left the University in good standing, or any person who is or has been a member of the teaching, research, or administrative staff of the University, or of the Board of Trustees of the University. Active members are those eligible members who are current contributors (dues or otherwise) to or life members of the George Washington University General Alumni Association,

the Alumni Association of any school of the University, or contributors to Annual Support Program.

The Alumni Office is in Alumni House, 714 Twenty-first Street, N. Washington, D.C. 20052. All alumni are urged to keep the Alumni Office formed of changes of address or occupation and to supply information w regard to their fellow alumni.

THE GEORGE WASHINGTON UNIVERSITY MEDICAL ALUMNI ASSOCIATION

The George Washington University Medical Alumni Association, incorpora in 1959, continues the organization previously known as the George Washi ton University Medical Society.

The stated purposes of the Association are as follows: "This shall be a no profit organization international in scope, whose objectives shall be to provi constructive services for the M.D. degree alumni of the George Washingt University School of Medicine and Health Sciences for furthering the art a science of medicine, research, and for the promotion of the welfare of t George Washington University School of Medicine and Health Sciences, students, the George Washington University Hospital and its trainees."

Active membership in the Association consists of all M.D. degree graduat of the School of Medicine and Health Sciences; current members and, on appl cation, past members of the teaching staff of the School of Medicine and Heal Sciences, who hold doctoral degrees; doctors of medicine who have had on or more years of postgraduate training in the George Washington Universit Hospital. Junior membership consists of all members of the student body o the M.D. degree program of the School of Medicine and Health Sciences.

The Medical Alumni Association maintains an office in the School of Med cine and Health Sciences.

Officers for 1977–78

President—Dee Parkinson, M.D. 1963
President Elect—Sidney Levine, M.D. 1941
First Vice President —William Cooper, M.D. 1949
Second Vice President—Harry C. Beaver, M.D. 1963
Secretary—William Thompson, M.D. 1967
Treasurer—John Lyles, M.D. 1970
Council:
Brooks Brown III, M.D. 1969
Marvin Footer, M.D. 1942
John Mermel, M.D. 1960
Milton Milne, M.D. 1964
Alvin Parrish, M.D. 1945
Julius Piver, M.D. 1952
William Schewe, M.D. 1943
Barbara Sherwin, M.D. 1967
Robert K. Wineland, M.D. 1951
Paul Zimmons, M.D. 1967

THE DOCTOR OF MEDICINE DEGREE PROGRAM

ADMISSION

The George Washington University School of Medicine and Health Scienc seeks to enroll intellectually gifted, humanly sensitive, mature persons who w excel in the science and art of medicine. Applicants of diverse social and ed cational backgrounds have access to the admissions process. In the selecti process there is no discrimination because of sex, race, color, religion, ag marital status, or national or regional origin.

Entrance Requirements

ADMISSION TO THE FIRST-YEAR CLASS

For admission to the Doctor of Medicine degree program, a minimum of 9 semester hours must have been earned in an accredited American or Canadia institution of higher learning. Credits earned in a professional school can b applied to the fulfillment of this minimum requirement only if they are accep able by the applicant's college or university toward a bachelor's degree in art or science. (A credit under the quarter system is two-thirds of a semester hour.) It is advantageous to complete four full years of undergraduate study. Only ex ceptional students are accepted upon completion of the minimal requirements.

It is possible for exceptional students with three years of undergraduate work in Columbian College of George Washington University to be admitted to this medical school and to receive a combined Bachelor of Arts-Doctor of Medicine degree. More detailed information on this program is given on page 31.

The following courses must be completed with satisfactory achievement be fore the applicant can be certified for matriculation. All required science courses must include sufficient laboratory work to give assurance of familiarity with the experimental methods and techniques of the disciplines.

1. **Biology:** Eight semester hours, including two semester hours of labora tory. This may be either in general biology or zoology, but may *not* include separately credited courses in botany.

2. **Chemistry:** Eight semester hours of general inorganic chemistry (which may include qualitative analysis), including two semester hours of laboratory; six to eight semester hours of organic chemistry, including laboratory.

3. **Physics:** Eight semester hours, including at least two semester hours of laboratory.

4. **English:** Six semester hours in composition and literature. This may be the usual introductory college course or its equivalent.

The number of required courses has been kept to a minimum in order to allow college students the time to pursue their own interests in depth. The Admissions Committee has no preference with regard to the major area of study of the applicant. Students with backgrounds in the arts, humanities, and social sciences are as admissible as applicants with science backgrounds. The Committee does expect that work in the student's chosen area of concentration as well as in the required science courses should reflect scholarly interests and show evidence of significant achievement.

ADMISSION WITH ADVANCED STANDING

General Requirements.—Advanced standing application can be made for transfer into the second or third year programs. No applications will be accepted for the fourth year program. The applicant must be or have been registered in an accredited school of medicine. He or she must be in good standing and eligible to continue in the school where currently enrolled or eligible to re-enter the former medical school if his or her education has been interrupted.

All applicants, except those presently enrolled in Doctor of Medicine degree programs in U.S. or Canadian medical schools, are required to achieve a score of 380 or better on each relevant subsection of the National Board of Medical Examiners test. American students enrolled in foreign medical schools must apply to take this test under the auspices of the Coordinated Transfer System (COTRANS) of the Association of American Medical Colleges. Applicants not enrolled in U.S. or foreign Doctor of Medicine degree programs can petition the Office of Admissions for sponsorship for the National Board of Medical Examiners test. This petition must be received no later than March 15 of the year for which admission is sought.

Requirements for Admission to the Second Year.—The applicant must have completed a course of study at least equivalent to that required of medical students at this University for advancement to the second year. Course work in anatomy, biochemistry, microbiology and physiology must have been completed at an accredited medical school. Applicants who are not matriculated at a U.S. or Canadian medical school must score above 380 in each of the Part I exam subtests on the National Board of Medical Examiners, Part I Examination. It is also advisable that the applicant have experience in or knowledge of normal psychological development, epidemiology and statistics.

Requirements for Admission to the Third Year.—The applicant must have completed a course of study at least equivalent to that required of medical students at this University for advancement to the third year. Course work in anatomy, biochemistry, microbiology, physiology, pharmacology, pathology, physical diagnosis and clinical assessment must have been completed at an accredited medical school. The applicant who is not matriculated at a U.S. or Canadian medical school must score above 380 on each of the subtests included on the Part I examination given by the National Board of Medical Examiners. Applicants should have completed a course of study similar in content to the interdisciplinary clinical sciences program required of second-

year medical students at this University (see page 30). This program consi
of four courses, Idis 201, Path 201, Phar 201 and Pchi 201, and covers dide
tic work in varying clinical medicine areas and practical work in clinical eva
ation of patients.

Application Procedure

APPLICATION TO THE FIRST-YEAR CLASS

Application forms are available from the Office of Admissions. All applican
are reminded that the submission of materially false or misleading informatio
in application forms or in connection with the application process shall
grounds for rejection. If such submission is discovered after entrance in
the School or award of a degree, it shall be grounds for dismissal or for revoc
tion of the degree.

The School is a participant in the American Medical College Applicatio
Service (AMCAS). Applications for a place in the first-year class can be ob
tained only from AMCAS, 1776 Massachusetts Avenue, N.W., Suite 30
Washington, D.C. 20036. When completed, this application is returned
AMCAS for distribution to schools selected by the applicant. The AMCAS ap
plication deadline is November 15 of the year preceding that for whic
admission is sought.

After receipt of our copy of the AMCAS application, the Office of Admis
sions will send applicants a Supplemental Application. This requests informa
tion not included on the AMCAS application. Submission of this supplement
application (due no later than January 15), including the nonrefundable
supplemental application fee ($25), will initiate Admissions Committee pro
cessing of the application. On the basis of available information some ap



plicants will be asked to have letters of evaluation (recommendation) sent. After careful review of these documents the committee will extend an invitation for interview to the most promising candidates. When these steps are completed, the application will be brought to the Admissions Committee for final decision. Applicants will be informed of final decisions immediately. Although it does not assume an obligation to report missing or erroneous credentials, the Admissions Office will try to contact the applicant if it is noted that necessary credentials are missing.

This institution also participates in the AMCAS Early Decision Program. Interested applicants are referred to the AMCAS Information Booklet included with the AMCAS application materials. Early decision applicants should be aware that they must submit their application by August of the year preceding that for which admission is sought, and that for consideration, the supplemental application and all letters of recommendation and transcripts must be received by the Office of Admissions no later than September 1. Decisions on early decision candidates are made usually by October 1 and no later than October 15.

Applicants are referred to the AMCAS information booklet and to the admissions brochure available from the Office of Admissions, School of Medicine and Health Sciences, for the most up-to-date information available at the time of application. Details included in those sources supersede information contained herein.

APPLICATION WITH ADVANCED STANDING

Applications for admission with advanced standing should be obtained from the Office of Admissions (M.D. Program), School of Medicine and Health Sciences, 2300 Eye Street, N.W., Washington, D.C. 20037.

All applicants must complete an advanced standing application form and submit it with a $25 application fee no later than June 1.

The dean of the school in which the applicant is enrolled must submit a letter of recommendation stating that the applicant is eligible to continue in that school, the reasons for transfer and an overall evaluation of the student. Letters of recommendation are also required from a member of the school's basic science faculty and from either a member of a different basic science department or from someone who is personally aware of those characteristics of which the applicant wishes the Admissions Committee to be aware.

Official transcripts of the applicant's record must be sent from each institution attended since high school. Students enrolled in foreign medical schools must include certified copies and a translation of their medical school records with their applications.

Applicants who are accepted must have final official transcripts sent to this University prior to matriculation here.

The most recent application information will be made available at the time an applicant requests the application. That information will supersede information contained herein.

Selection Procedures

To process the vast number of applications to this institution fairly and expeditiously, a screening evaluation system is utilized. This evaluation proce-

dure screens applicants on the basis of undergraduate grades (taking into count improvement in performance in later years), Medical College Admiss Test scores, and pertinent extracurricular and work experiences. Some ad tional consideration is given to applicants from the District of Columbia a the neighboring metropolitan area, as well as to applicants from George Wa ington University. There are no age limits.

When all credentials and interview reports are available, the application is viewed by the Admissions Committee. In this review, although grades a MCAT scores are considered, major consideration is given to the essay p tions of the applications, the letters of evaluation, and the interview reports, an attempt to assess those motivational and personal characteristics that t committee feels are important in choosing future physicians.

Applicants who are offered a place in the class are required, within two week to notify the Office of Admissions (M.D. Program), School of Medicine a Health Sciences, in writing, of their intent to accept the places reserved f them. A deposit of $100 is also required by a specific date after notification acceptance. The date will be given in the notice of acceptance. The depos becomes nonrefundable two weeks prior to registration but will be credite toward the first semester's tuition.

PROGRAM OF STUDY

The faculty and administration of the School of Medicine and Healt Sciences have developed a curriculum designed to prepare each student for professional life of continuous learning. Because students differ in backgroun ability, and career interests, the curriculum is balanced with required courses and students are encouraged to maximize achievement within their own limits It is presumed that all graduates will seek additional education in graduate training programs before assuming complete responsibility for independent clinical decision-making.

In the first year, the student concentrates primarily on basic sciences. Th course of study includes anatomy and biochemestry in the first semester. In the second semester, the student concentrates on physiology and microbiology in addition to an integrated course in neurobiology.

Freshman and sophomore medical students are permitted to register for electives for credit or use elective time at their discretion. The first two weeks of an elective are probationary, to enable students to decide whether it is suited to their needs. After completing the first two weeks of an elective students are committed to complete the course requirements.

The second year integrates basic science and clinical information. Pathology and pharmacology provide the major basic science substrates. The academic program has been evolving since 1970 and several innovations have been introduced each year. The course is coordinated by a program director. Integration is accomplished through the work of faculty subcommittees working with the program director and the second-year subcommittee on educational planning. Medical students are introduced to physical diagnosis during the first semester of the second year.

The final two years form a two-year continuum of required clerkships and elective sequences, designed to bring the student to optimal readiness for graduate training. Clerkships are required in medicine, surgery, pediatrics, obstetrics-gynecology, psychiatry, and health care sciences. Each student mus

complete a 4-week acting internship in one of the following: medicine, pediatrics, or family medicine. In addition, each student must take a 2-week clerkship in anesthesia and *two* 2-week clerkships from among the following: orthopaedics, urology, neurosurgery, or plastic surgery.

A variety of elective experience is available at the University and its affiliated hospitals; permission may be granted to take electives elsewhere.

During the entire educational experience, students are encouraged to assume responsibility for their self-assessment and continued learning. It is the goal of the faculty to select and educate concerned human beings who will function productively and effectively during a long career in medicine.

DEGREE REQUIREMENTS

Every candidate for graduation with the degree of Doctor of Medicine must have satisfactorily completed the requirements of the School of Medicine and Health Sciences as described on page 30, including no less than four academic years of study as a matriculated student in medicine or the equivalent. All required courses must be completed and all prescribed examinations satisfactorily passed.

HONORS

Candidates who have completed the four-year course for the Doctor of Medicine degree and have received the grade of *H* (Honors) in courses totalling 50 per cent or more of the total number of semester hours taken may be recommended by the Executive Committee of the Medical Center for graduation "With Distinction."

COMBINED DEGREE PROGRAMS

Combined Bachelor of Arts and Doctor of Medicine

To be recommended for the degree of Bachelor of Arts, the candidate must complete at least 94 semester hours of prescribed college work (at least 30 hours and one year of residence must be completed in Columbian College of Arts and Sciences) and the first year of the medical curriculum. Upon satisfactory completion of the fourth year of the medical curriculum the student becomes eligible for the degree of Doctor of Medicine.

It should be understood, however, that admission to Columbian College does not guarantee admission to the School of Medicine and Health Sciences.

Combined Master of Science and Doctor of Medicine

The departments of the School of Medicine and Health Sciences cooperate with the Graduate School of Arts and Sciences in offering programs leading to the combined degrees of Master of Science and Doctor of Medicine in the fields of biochemistry, genetics, microbiology, mycology, pharmacology, and physiology.

Students in the School of Medicine and Health Sciences who wish to apply for the combined degrees of Master of Science and Doctor of Medicine must meet

the requirements for admission to the Graduate School of Arts and Science They must be recommended by the chairman of the department and by the Dea of the Graduate School of Arts and Sciences and the Dean for Academic Affai of the Medical Center.

The Master of Science degree program consists of a minimum of 30 semest hours which includes a thesis (equivalent to six semester hours). For a Maste of Science degree program which does *not* include a thesis, the number o semester hours of graduate course work is determined by the department. Th program without the thesis is not an individual student option and is no available in every department.

A maximum of 12 semester hours of credit for graduate-level courses com *pleted as a part of the Doctor of Medicine degree* (and not already applied to ward the bachelor's degree) will be allowed in fulfillment of the requirement of the Master of Science degree. The remaining semester hours of work, includ ing a thesis if it is required, must be in course work in the basic medical science normally required for a Master of Science degree in the Graduate School o Arts and Sciences.

Dual Program for the Doctor of Medicine and Doctor of Philosophy Degrees

In cooperation with the Graduate School of Arts and Sciences a dual program is available to qualified students who seek both the Doctor of Medicine and Doctor of Philosophy degrees. The requirements which must be fulfilled for both degrees are identical to those currently and separately established in the School of Medicine and Health Sciences and the Graduate School of Arts and Sciences.

To enter the dual degree program, a prospective student first must apply for and gain admission to both the Graduate School of Arts and Sciences and the School of Medicine and Health Sciences separately through established proce dures. Upon admission to both schools, the student may then apply for affilia tion with the dual degree program. Work toward the Doctor of Philosophy de gree is performed under the jurisdiction of a *departmental* doctoral committee and is available in more than 50 research fields.

A student working toward these degrees may apply a maximum of 24 semes ter hours of approved work taken in the M.D. degree program of the School of Medicine and Health Sciences toward the total of 72 semester hours required to complete the requirements for the Doctor of Philosophy degree. Twenty-four hours of this requirement must be earned in graduate courses during periods when the student is not obligated to full-time enrollment in the M.D. degree pro gram, i.e., during summer sessions, vacation periods, etc. The final 24 semester hours of dissertation research toward the Doctor of Philosophy degree may be gin concurrently with the final semester of graduate course work. The esti mated time for completion of this dual program is six years.

Master of Science and Doctor of Philosophy Requirements

The detailed requirements for the degrees of Master of Science and Doctor of Philosophy are stated in the *Undergraduate and Graduate Catalogue* of the University, which is available at the Graduate School of Arts and Sciences, George Washington University, Washington, D.C. 20052.

FEES AND FINANCIAL REGULATIONS FOR M.D. CANDIDATES

The following fees have been established for the academic year 1978–79.*

Application fee	$25.00
Tuition fee, for the academic year for 1st-year medical students	11,800.00
Tuition fee, for the academic year for 2nd-year medical students	9,600.00
Tuition fee, for the academic year for 3rd-year medical students	8,100.00
Tuition fee, for the academic year for 4th-year medical students	6,500.00
University Center fee, charged all students (except those granted "leave of absence" status) each semester	50.50
Late registration fee, for failure to register within the designated period	15.00
Late payment fee, charged for failure to make payments when due (see "Payment of Fees," below)	15.00
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below)	35.00
Continuous Registration fee, charged each student granted "leave of absence" status for each semester in the School of Medicine and Health Sciences, nonrefundable	110.00
University Center fee, charged each student granted "leave of absence" status, each semester	4.75
Graduation fee	25.00
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds or for any other reason	15.00
Transcript fee, for each transcript of record	2.00
If two or more transcripts are requested at the same time, fee for the first two copies is $2 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

Projected Tuition and Fee Increases 1979–80

It is certain that tuition and some other fees for 1979–80 will be increased over those shown above for 1978–79. Every effort will be made to keep the increase as small as possible consonant with prudent financial management. Tuition and other fee charges for 1979–80 will be available upon request by February 1, 1979.

The University Center fee will be increased for the academic year 1979–80. The fee will be $55.50 per semester. Students granted "leave of absence" will pay $5.25.

Payment of Fees

The annual fee for the 1978–79 academic year is payable in two equal installments on or before registration day for each semester. M.D. students who register during the summer for courses offered in other divisions of the University will be charged the regular summer tuition and other fees. No tuition will be charged M.D. students for Medical School clerkships elected by the student during the summer between the second and third years. No additional tuition

* For courses offered in other divisions of the University, the following Summer Sessions fees apply for each semester hour: 1978—tuition, $105.00; University Center fee, $4.75. 1979—tuition, $110.00; University Center fee, $5.25.

will be charged third year students for courses taken anywhere in the Uni
sity during the summer prior to registration as a fourth year student. No
dent is permitted to complete registration or attend classes until all charges
paid. Tuition and fees are payable at the Office of the Cashier of the Uni
sity. Checks should be made payable to George Washington University,
student indentification number shown in upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintai
student accounts for tuition, various fees, and room and board charges. W
tuition is due and payable in full as described above, students may sig
deferred payment contract with the Student Accounts Office at the time
registration permitting them to pay one-half of the total tuition and fees
cept for fees payable in advance) at the time of registration and the remai
half on or before October 25, 1978 (for the fall semester), and March
1979 (for the spring semester). Interest at the rate of eight per cent per ann
on the unpaid balance will be charged from the date of registration to the
payment is made.

Students receiving tuition assistance in the form of scholarships, gov
ment tuition contracts, or other forms of tuition awards are not permitte
sign deferred payment contracts unless the total tuition and fee charges exc
the value of the tuition awards by $1,500 or more per semester. Under s
circumstances the student may be permitted to pay one-half of the amo
due from the student at the time of registration and to defer the balance
signing a deferred payment contract.

Students who fail to make any payment when due will be automatic
charged a $15 late payment fee and will be subject to the interest charge
eight per cent per annum. Accounts which become 30 days past due will
financially encumbered. In the event a student's account is financially enc
bered, the student forfeits rights to the use of the deferred payment contr
in future semesters, and the Student Accounts Office will notify the Registra
withhold grades, future registration privileges, transcripts, diplomas, and ot
academic information until the account is settled financially. Financial set
ment will require payment in full of all amounts due the University in addi
to a financial reinstatement fee of $35.

After entering the course of instruction the student is obligated for
tuition for the full semester. A student registered for medical electives in
summer session between the second and third year is obligated for tuition du
the time of registration for the following fall semester, except that in the case
withdrawal or leave of absence a *pro rata* payment will become due immediat

Acceptance by the University of a student's fees does not in any way o
gate the School of Medicine and Health Sciences to accept the student for
subsequent semester or summer session, and the right is reserved to require
withdrawal of any student whenever, in the interest of the student or the Sch
the Executive Committee of the Medical Center deems it advisable to do

Cost of Textbooks and Student Equipment

The minimum cost of necessary textbooks and student equipment (microsc
drawing materials, glass slides, clinical thermometer, stethoscope, hemocy
eter, uniforms, etc.) is approximately as follows: first year, $700; second
$400; third year, $200; and fourth year, $200. Microscopes must be prov
by the student. Rentals are not available from the School.

Prepaid and Deferred Payment Plans

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Street, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

REGULATIONS FOR M.D. CANDIDATES

Attendance

A student is not permitted to attend classes until registration has been completed and fees due have been paid. Regular attendance is required.

Grades

H (Honors); *P* (Pass); *F* (Fail); *CN* (Conditional); *IP* (In Progress); *I* (Incomplete); *W* (Withdrawal).

H (Honors).—Those students whose performance in a subject as determined by the department concerned is of a very high caliber, and who, *in addition*, have demonstrated those qualities of intellectual curiosity, integrity, and self-discipline which clearly set them apart from the majority of the group, may be assigned the grade of *H* (Honors).

P (Pass).—All students, with the exception of those specifically defined above, whose performance in a subject meets the minimum requirements established by the department concerned, shall be assigned a grade of *P* (Pass).

F (Fail).—Those students whose performance in a subject as determined by the department concerned is of such a low caliber that a satisfactory level of performance could not reasonably be expected to be attained by a program of guided study developed by the department shall be given a grade of *F* (Fail). A grade of *F* requires that the student repeat the course at this or some other institution approved by the department and the Dean for Academic Affairs prior to proceeding to the work of the following year. Upon completion of such a course with a grade of *P* (Pass) or its equivalent, the student shall be permitted to continue in the M.D. program and the grade of *F* converted to *F/P*.

CN (Conditional).—Those students who do not meet the minimum requirements established by the department concerned but who could reasonably be expected to do so through a program of remedial work to be developed by the department and approved by the Committee on Educational Evaluation, shall be assigned the grade of *CN* (Conditional). The grade of *CN* is not a

passing grade and must be upgraded prior to beginning the next academ year or, in the case of clinical subjects, prior to graduation. Upon certifica tion by the department that the student has attained suitable proficiency the subject, as evidenced by examination or such other criteria as may appropriate, the student shall be permitted to continue in the M.D. progra and the grade of *CN* converted to *CN/P*.

A student may, in lieu of such a program, elect to repeat the course at thi or any other institution which is approved by the department concerned. grade of *P* (Pass) or better shall then result in conversion of the *CN* to *CN*

Failure to upgrade a *CN* to *CN/P* by one of these procedures within th prescribed period shall result in the automatic conversion of the *CN* to *CN*

IP (In Progress).—The grade of *IP* will be assigned to students in course which require more than one semester for completion. A grade will be as signed upon completion of the entire course in a subsequent semester.

I (Incomplete).—The grade of *I* will be assigned when a student fails to com plete all the required work in a course for reasons acceptable to the Dean fo Academic Affairs. A student in the first or second year may not proceed int the work of the following year until a grade of *I* has been removed; if no removed, a grade of *I* will be changed automatically to a grade of *F* (Fa after one year. A student in the third or fourth year must remove a grade o *I* prior to graduation.

W (Withdrawal).—The grade of *W* will be assigned only when a student i unable to continue in school for reasons acceptable to the Dean for Academic Affairs. Such reasons may *not* include scholarship. The student may be read mitted at the discretion of the Dean for Academic Affairs, within a perio of two years, and may repeat for credit the course or courses in which th grade of *W* had been assigned.

Grading of First- and Second-Year Electives

The first two weeks of an elective in the first and second year are probationa to enable students to decide whether it is suited to their needs. After comp ing the first two weeks of an elective, the student is committed to comple the course requirements and each elective shall be graded on a Pass Fa system with the grade *P* or *F* recorded on the student's transcript. Distin guished performance should be recognized by sending a letter to the Dean fo incorporation into the student's file.

Definition of Good Academic Standing

A student is considered in good academic standing until such time that he she is formally dismissed from the Doctor of Medicine degree program. In other words, for those programs that require a statement of good academic standing from the institution, such a statement will be forthcoming on a student unless he or she is formally dismissed from the Doctor of Medicine degree program of the School of Medicine and Health Sciences.

Academic Probation and Academic Dismissal

On recommendation of the Educational Evaluation Committee, the Dean of Academic Affairs may place a student on academic probation or dismiss h

or her from the M.D. program. The Educational Evaluation Committee shall make its recommendations after careful and individual review considering the total number of credit hours of *CN* and *F* grades in required courses and required elective courses attained by the student during the M.D. program, without regard to whether these grades have been upgraded by further study; except that in the case of a student who has been permitted to repeat a year, the initial grades will not be included in this total.

Academic probation and academic dismissal may be recommended by the Educational Evaluation Committee under the conditions described below.

Academic Probation.—A student who receives grades of *F* in courses totaling six or more semester hours, or a combination of grades of *F* and *CN* in more than six semester hours in one semester, shall be placed on academic probation for the following semester. A student who, while on probation, receives a grade of *F* or *CN* in any course will be continued on probation for the following semester. A student who, through action of the Educational Evaluation Committee and the Dean for Academic Affairs, has been permitted to repeat a year shall be placed on academic probation. All students on academic probation shall be reviewed by the Educational Evaluation Committee at the end of their probational periods.

Academic Dismissal.—A student (1) who is on academic probation for four or more semesters, consecutive or otherwise; or (2) who receives grades of *F* in courses totalling 14 or more semester hours in any academic year; or (3) who receives grades of *CN* or *CN* and *F* combined in courses totalling more than 20 semester hours of work in any academic year; or (4) who receives grades of *F* in more than 20 semester hours of work in the M.D. program; or (5) who receives grades of *CN* or *CN* and *F* combined totalling more than 30 semester hours of work in the M.D. program; or (6) whose knowledge and clinical competencies have not achieved, in the judgment of the Educational Evaluation Committee, a satisfactory level of development and integration at any stage of training to justify continuing him or her as a reasonable candidate for the M.D. degree will be subject to dismissal from the M.D. degree program. (See also section on Evaluation of Non-Academic Competence.)

Evaluation of Non-Academic Competence

To assure the safety of the public, the institution reserves the right to dismiss from the M.D. program any student whose behavior is clearly unacceptable or would be dangerous in the practice of medicine. Since it would be impossible to catalogue all behaviors which might raise serious question as to the student's competence to continue in medical school, a process has been established to deal with problems in this domain. Safeguards have been taken to prevent this from becoming a mechanism to discourage deviation from social norms, or to suppress personal or political expression. It is carefully designed to protect any student from discrimination on the basis of his or her beliefs or personal behavior where these are not likely to be dangerous to the public should the student become a physician.

Upon receipt of a written complaint about a student, the Dean for Student Affairs would inform the student and conduct a confidential inquiry. Possible dispositions would be to advise the student, to drop the matter entirely, or to refer it on to a subcommittee of the Educational Evaluation Committee. Two

of the subcommittee's four members would be medical students. The sub committee's proceedings would also be confidential, and would result in advis ing the student, dropping the matter or referring it on to the Educational Evaluation Committee. Its recommendations might be to discontinue the in quiry, to place the student on probationary status (which would be carefully defined), or to dismiss the student from the M.D. program. At every stage, the student would have the right of appeal.

Any interested person may receive a copy of the complete regulations for students in the M.D. program from the Admissions Office or from the Office of the Dean for Academic Affairs.

Examinations

Examinations, which may be written, oral, or practical, will be held during and/or at the end of each semester.

Graduation

Graduation follows satisfactory completion of the course of study, and does not imply the acquisition of a set number of credit hours.

Application for Graduation.—Application for graduation must be filed in the Office of the Dean for Academic Affairs, and the fee must be paid at the time of registration for the last semester of the fourth year.

Presence at Graduation.—A candidate is required to be present at the graduation exercises unless written application for graduation *in absentia* is approved by the Dean for Academic Affairs.

FINANCIAL AID

The following fellowships, scholarships, and loan funds are available to students in the School of Medicine and Health Sciences. Unless otherwise specified, inquiries should be directed to the Financial Aid Office of the Medical Center, George Washington University, 2300 Eye Street, N.W., Washington, D.C. 20037.

Fellowships

Wilbur J. and Edith K. Carr Memorial Fellowship Fund (1965).—By bequest of Edith K. Carr, former trustee of the University. The income from this fund provides fellowships in surgery, medicine, or medical research at the George Washington University Hospital.

Samuel Jordan Graham Fellowship in Surgery (1961).—By bequest, in memory of Judge and Mrs. Graham. The income from this fund, up to $2,000, may be used to assist students who are pursuing postgraduate study or research, preferably in surgery, at the School of Medicine and Health Sciences.

If no individual is conducting such work or deserving of the award, the income may be used to provide one or more scholarships (to cover tuition and other school expenses deemed appropriate) for students in the School of Medicine and Health Sciences. Application should be filed with the Chairman of the Department of Surgery no later than March 1.

Robin Miller Research Fellowship (1953).—A $3,000 fellowship established by bequest of Mrs. Robin Miller for the study of cardiovascular diseases.

Henry Rau Foundation Student Fellowship Grant (1967).—Awarded annually to a student in the School of Medicine and Health Sciences for research in cancer and allied diseases at the George Washington University Clinic.

U.S. Public Health Service Training Grants.—Information concerning training grants in fields of the medical sciences is available at the Office of the Dean for Academic Affairs of the Medical Center.

Scholarships

Scholarships awarded to students in the M.D. degree program are credited for the academic year unless otherwise specified. Each holder must carry a full schedule of academic work during the period for which the scholarship is awarded. Applicants should apply on prescribed forms which must be filed in the Financial Aid Office of the Medical Center no later than March 15 preceding the academic year for which the scholarship is to be awarded.

Achievement Rewards for College Scientists (ARCS) Foundation, Inc., Scholarship.—Awarded to a student on the basis of financial need and superior grades. Candidates must be citizens of the United States.

Armed Forces Health Professions Scholarship Program (1972).—Available to members of the armed forces who qualify under Public Law 92–426. Interested individuals should write to one of the following: (1) Department of the Army, DASG-PTP, Washington, D.C. 20314; (2) Bureau of Medicine and Surgery, Navy Department (Code 3174), Washington, D.C. 20372; (3) ATC/RSOS, Randolph Air Force Base, Texas 78148.

Anna Bartsch Hospital Intern Scholarship (1946).—A partial scholarship established by Dr. Anna Bartsch-Dunne as a memorial to her mother. Awarded to a woman intern in the University Hospital.

Dr. Edith SeVille Coale Scholarships (1965).—Provided at the request of Dr. Coale for women in the School of Medicine and Health Sciences. The scholarships are administered by the Zonta Club of Washington. Application should be made to the Financial Aid Office of the Medical Center no later than December 1.

Joseph Collins Foundation Scholarships (1951).—Available to medical students upon application through the Financial Aid Office of the Medical Center.

Joan Luria Hines Scholarship (1968).—Established by friends, students, and faculty of the School of Medicine and Health Sciences as a memorial to the wife of a medical student.

The Garfield and Rose Kass Medical Scholarship (1975).—Awarded on the basis of need to a worthy student in the School of Medicine and Health Sciences.

Ki-Wives of Washington Scholarship Fund (1958).—Three scholarships available to students in the School of Medicine and Health Sciences.

Sidney A. Levine Scholarship Fund (1971).—Established to assist medical students on the basis of need and academic performance.

Thomas M. Peery Scholarship (1974).—Awarded on the basis of need to a worthy student in the School of Medicine.

School of Medicine Scholarship Fund (1968).—Established by gifts of various and anonymous donors to assist medical students.

Gordon Fay Willey Scholarship (1974).—Awarded to students whose parents are U.S. citizens who are or were enlisted men, non-commissioned officers

and officers below the grade of Major in the Army or Air Force or Cap
in the Navy of the United States.

Winslow Foundation Scholarship (1974).—Available to medical stude
who are residents of Maryland, the District of Columbia, or North Caroli
on the basis of need.

Medical Student Research Scholarships and Traineeships.—For student p
ticipation in the research programs of the School of Medicine and He
Sciences or special training in research methods. Research scholarships are
dinarily awarded for full-time activity during the summer months: resear
traineeships support part-time work during the academic year. Scholars a
"matched" with members of the faculty in accordance with their mutual int
ests. Trainees are designated by the departments responsible for the progra
These programs have been sponsored by the National Institutes of Health
addition a number of research scholarships have been made available throu
the Washington Heart Association.

School of Medicine Scholarship Fund

Scholarship aid is awarded from income on endowments that have been est
lished by gifts from various donors for tuition awards to students in the Sch
of Medicine and Health Sciences. Listed below are the endowments that s
port the School of Medicine Scholarship Fund:

Anna Bartsch Scholarship Fund (1946).—Established by Dr. Anna Bartsc
Dunne as a memorial to her mother. Awarded to a woman in the Schoo
Medicine and Health Sciences "of outstanding scholarship, character,
promise, who intends to make the practice of medicine her life profession."

Jack I. Bender Scholarship Fund (1967).—Established by the family of J
I. Bender as a memorial to their father. Awarded annually to a student on
basis of academic performance and need.

Everett Lamont Bradley Scholarship Fund (1954).—By bequest of Alice R
Bradley in memory of her son, for a student in the School of Medicine
Health Sciences.

Elma B. Carr Scholarship Fund (1976).—Created from income distribut
of the Elma B. Carr, M.D. Trust, the income to be used for scholarships
the School of Medicine.

Oliver C. Cox Scholarship Fund (1973).—Established in memory of
Oliver C. Cox, "for the establishment, support and maintenance of endow
scholarships in medicine."

Loughran Medical Scholarship (1976).—A partial scholarship establishe
the Mary and Daniel Loughran Foundation, Inc., for residents of the W
ington metropolitan area. Such residency must have been established prio
the commencement of the recipient's undergraduate studies. Awarded 197
and every third year thereafter.

David Perry Steinman Memorial Scholarship Fund (1960).—Establishe
friends and classmates. Awarded annually to a second-year student in
School of Medicine and Health Sciences on the basis of need and acade
performance.

James J. Whisman Scholarship Fund (1966).—By bequest of James J. W
man for needy and deserving students in the School of Medicine and He
Sciences.

Columbian Women Scholarship Funds

The Columbian Women Scholarships are awarded to women students on the basis of financial need and scholastic attainment. Candidates must have completed a minimum of 15 hours at this University with a minimum *B* (3.0) average, or the equivalent. A letter of application for these scholarships should be addressed to the Chairman, Columbian Women Scholarships, care of the Alumni Office, George Washington University, Washington, D.C. 20052, no later than May 15 for the fall semester, and January 1 for the spring semester. Scholarship aid is awarded from income of the following endowments:

Estelle M. Corbett Scholarship Fund (1973).—Created by gift of Elma Williams for tuition aid for a medical student.

Jessie Fant Evans Scholarship Fund (1967).—Established by bequest of Jessie Fant Evans, former Trustee of the University, for tuition aid.

Lewes D. and Myrtle H. Wilson Memorial Scholarship Fund (1926).—Established by Elizabeth Wilson, as a memorial to her parents, for tuition aid.

Loan Funds*

A.M.A. Medical School Loan Fund.—Created in 1964 by the American Medical Association, to be loaned to students.

Morris and Gwendolyn Cafritz Foundation Loan Fund for Medical Students.—Created in 1977 by the Morris and Gwendolyn Cafritz Foundation, to be loaned to students.

Carr Loan Fund.—Created in 1962 by Edith K. Carr, to be loaned to students.

Abraham I. Gimble Medical School Loan Fund.—Created in 1977 by gift of Dr. Abraham I. Gimble, to be loaned to deserving and needy students.

Katharine Graham Medical School Loan Fund.—Created in 1978 by gift of Katharine Graham, to be loaned to deserving and needy students.

Himes Loan Fund.—Created in 1957 by Joseph H. Himes.

Kellogg Medical School Loan Fund.—Created in 1942 by the W.K. Kellogg Foundation, to be loaned to students.

Dr. Esther A. Nathanson Memorial Medical Loan Fund.—Created in 1977 in memory of Esther A. Nathanson, A.B. 1922, M.D. 1925, by her sister, Sadie C. Nathanson, to be loaned to deserving and needy students.

Pfizer Loan Fund.—Created in 1953 by Charles Pfizer and Company, Inc., to be loaned to students.

School of Medicine Medical Student Loan Fund.—Created in 1952 by School of Medicine students, and augmented by a bequest from the estate of Ethel L. Murray to be loaned to students.

Strauss Medical School Loan Fund.—Created in 1975 by gift of Lewis H. Strauss and Mrs. Lewis L. Strauss in memory of Honorable Lewis L. Strauss, to be loaned to students.

Sutherland Loan Fund.—Created in 1941 by gift of Rose L. Sutherland and other donors.

Waller Loan Fund.—Bequest of Helen S. Waller received in 1973, to be loaned to deserving and needy students.

Janice and George Wasserman Medical Student Loan Fund.—Created in

* See the George Washington University School of Medicine and Health Sciences *Financial Aid Handbook* for more complete information.

1978 by the George Wasserman Foundation, Inc., to be loaned to deservi
and needy students.

Wrather Loan Fund.—Created in 1967 by gift of Mrs. W.E. Wrather
memory of her husband, to be loaned to students.

In addition, financial assistance is available through the—

*American Medical Association Medical Education Loan Guarantee Progra
(1960).*—Available to medical school students (beyond the first semester
the M.D. degree program).

Catherine Breen Student Loan Fund (1972).—Established by alumni of th
School of Medicine and Health Sciences in honor of Catherine Breen, form
Assistant to the Dean of the Medical Center. Available to needy students wh
are candidates for the degree of Doctor of Medicine. Applications should
made to The George Washington University Medical Alumni Association.

Health Professions Student Loan Program.—This fund is available to a fu
time student pursuing a course of study leading to the degree of Doctor
Medicine. Interns, residents, students engaged in premedical or other profes
sional training, and students enrolled in programs of study other than tho
leading to the degree mentioned above are *not* eligible for these loans.

A candidate must (1) be a citizen of the United States or have such imm
gration status and personal plans as to indicate an intention to become a pe
manent resident of the United States, (2) be in need of the amount of the loa
to be able to pursue the course of study, and (3) be in good standing with
School. Inquiries concerning deadlines and applications should be directed
the Financial Aid Office of the School of Medicine.

Jessie B. Martin Loan Fund (1967).—Established by friends of Jessie
Martin, former Editor of Academic Publications at the University. An emer
gency fund for loans up to $200, repayable in 30-60 days, with interest rate
3 per cent per annum. Application should be made to the Director of
Office of Student Financial Aid of the University.

PRIZES

***Janet M. Glasgow Award of Outstanding Achievement, American Medi
Women's Association, Inc.***—Awarded annually if the student standing firs
the graduating class is a woman.

*American Medical Women's Association, Inc. Scholarship Achievem
Citation.*—Awarded annually to those female students who are considered
"honor graduates" when ranked against all other students in the graduat
class.

Samuel M. and Miriam S. Dodek Prize (1967).—Established in memor
Professor Bernhard Zondek, the eminent discoverer of the endocrinology of
human female reproductive cycle. Awarded annually to a member of the gra
ating class who has attained a commendable knowledge and understanding
the field of female endocrinology.

Allie S. Freed Prize (1957).—Awarded annually to a member of the gradu
ing class who has demonstrated exceptional proficiency in the field of preven
medicine.

Walter Freeman Prize (1966).—Awarded annually to a student in the gra
uating class who submits the best essay based on original investigation.

Alec Horwitz Prize (1959).—A prize of $100 awarded annually to a stu
who has demonstrated exceptional proficiency in the field of surgery.

Oscar Benwood Hunter Prize (1952).—Established by The George Washington University Medical Society, now known as The George Washington University Medical Alumni Association. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in pathology.

Jacobi Medical Society Prize (1962).—Established in memory of Dr. Abraham Jacobi, the founder of pediatrics practice in the United States. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in pediatrics.

Howard Kane-A.F.A. King Obstetrical Society Prize (1937).—Established in memory of Dr. Howard Kane and Dr. A.F.A. King, who served as Professors in the School of Medicine and Health Sciences. Awarded annually to a member of the graduating class who has demonstrated outstanding ability in obstetrics and gynecology.

Dr. Harold Lamport Biomedical Research Prize.—A prize of $150, established by the Lamport Foundation in memory of the late, distinguished physiologist, Dr. Harold Lamport, awarded annually to the student writing the best paper on original laboratory investigation in physiology.

Lange Medical Publications Prize.—Awarded annually to two members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of four books published by Lange Medical Publications.

Huron W. Lawson Prize (1957).—A prize of $100 established by Mrs. Lawson in memory of her husband, who was a distinguished member of the Medical Staff of the University, presented annually to a member of the graduating class who has demonstrated exceptional proficiency in the field of obstetrics and gynecology.

Benjamin Manchester Prize (1966).—Established by a grateful patient in honor of Dr. Benjamin Manchester, clinical professor of medicine. Awarded annually to a member of the graduating class who has an outstanding record and shows promise of real humanitarianism in the practice of medicine.

C.V. Mosby Book Prize.—Awarded annually to five members of the graduating class who are considered outstanding by their classmates. The prize consists of the graduate's choice of a book published by C.V. Mosby Company.

Julius S. Neviaser Prize in Orthopaedic Surgery (1956).—A prize of $100 awarded annually to the senior who scores the highest grade in a written examination and clinical aspects of orthopaedic surgery.

John Ordronaux Prize (1907).—By bequest, $150 awarded annually to the member of the graduating class who has the highest scholastic standing.

William G. Schaffirt Prize (1966).—By bequest, $200 awarded annually to a senior student for the best original essay or thesis on some medical subject of current public interest.

Upjohn Achievement Prize.—A prize of $200 and an inscribed plaque awarded annually to a member of the graduating class selected by his or her classmates on the basis of outstanding scholastic and personal achievement.

HONOR SOCIETIES

Alpha Omega Alpha.—National Honor Medical Society. Third- and fourth-year candidates for the M.D. degree meeting the qualifications specified by the constitution of the Society are eligible for election to membership.

William Beaumont Medical Society.—Medical students who have performed

original research in the life sciences are eligible for membership, based up
the submission of an acceptable abstract of the research and election by
ciety members. Outstanding students present their research findings at
annual Student Research Day. The Society also sponsors guest lectures
medical research and assists students in finding research opportunities wit
the Medical Center.

Howard Kane-A.F.A. King Obstetrical Society.—The 15 third- and fourt
year candidates for the M.D. degree who maintain the highest grades in the
work in obstetrics are eligible for membership.

THE GERONTOLOGY PROGRAM

This program is designed to introduce and improve educational progra
within The George Washington University and its School of Medicine
Health Sciences, to encourage research and student involvement in the fiel
aging. A Bachelor of Science in Health Sciences degree is presently offe
through the Department of Health Care Sciences, and an area of conc
tration in gerontology will be offered by the new Division of Geriatric Medi
With the approval of their advisors, students in other schools in the Univers
may select courses in gerontology and geriatric care, offered throughout
University, to explore gerontology as a career option or to develop an are
concentration. A Master's degree program in gerontology is now availab
the Graduate School of Arts and Sciences. Students in approved programs
also draw on courses in gerontology offered through the Consortium of U
versities to further their educational goals.

The following courses in gerontology and related topics are offered by Col
bian College of Arts and Sciences, the School of Education and Human D
velopment, the School of Government and Business Administration, and
National Law Center.

HCA 250:	Delivery of Mental Health Services
HCA 260:	Introduction to Long-term Care Administration
HCA 261:	Seminar: Managing the Long-term Care Institution
HCA 267:	Issues in Aging
Soc 181–11:	Sociology of Aging
Soc 181–12:	Sociology of Death and Dying
Educ 208:	Human Development
Educ 353:	Counseling Older Persons
Law 579:	Clinical Studies in Urban Law

UNDERGRADUATE PROGRAMS IN ALLIED HEALTH

Programs of study in allied health sciences at the School of Medicine and Health Sciences include those disciplines and skills that are allied to medicine in the delivery of health care and health education. The faculty of the School recognizes that modern medical practice requires increasing numbers of non-physician health care professionals; that such allied health personnel are appropriately educated in an academic health center; and that new roles for health care providers require the introduction of new curricula in allied health and nursing education.

Programs in Allied Health Sciences are currently offered leading to the degrees of (1) Associate in Science, with areas of concentration in Medical Laboratory Technique, Nuclear Medicine Technology, and Radiologic Technology, and (2) Bachelor of Science in the fields of Health Science, Medical Technology, Nursing Anesthesia, and Radiologic Sciences and Administration, or with designation as Physician's Assistant or Nurse Practitioner.

Certificates are also awarded in the Medical Technology, Physician's Assistant, Nursing Anesthesia, and Nurse Practitioner programs. Special programs for second-career students may be arranged.

ADMISSION

The right is reserved to refuse admission to any student with an academic record which creates doubt of ability to succeed in college, or who, for any other reason, would not be an acceptable student. In the selection process, there is no discrimination because of sex, race, color, religion, or national or regional origin.

An application for admission to degree candidacy should be accompanied by a nonrefundable $10 application fee,* payable by check to The George Washington University. The application fee is waived for students applying for readmission who were registered as degree candidates at the time of their last registration at this University and who have not since registered at another institution.

Applicants should submit the application form and complete credentials by June 1. Some programs may require an earlier admissions date.

* This fee will be increased to $15 beginning with applications to admission to the Summer Session 1979.

Forms for application for admission or readmission are available at, and should be returned to, the Office of Admissions, George Washington University, Washington, D.C. 20052.

Admission to Degree Candidacy

The following are required for admission to degree candidacy in all Allied Health programs:

1. Graduates of secondary schools must have a diploma based upon an acceptable academic record from an accredited secondary school. Applicants who have not graduated from secondary school must have satisfactory scores on the General Educational Development (GED) High School Level tests.

2. Students who have completed secondary school within two years of the date of their application for degree candidacy and who have not attended any other college or university must have acceptable scores on the Scholastic Aptitude Test (SAT) of the College Entrance Examination Board (CEEB)*; applicants without previous college work who have completed secondary school more than two years before their date of application may substitute acceptable scores on the College-Level Examination (CLEP) or acceptable scores on the General Educational Development (GED) High School Level test.

3. Students who have completed fewer than 12 semester hours of acceptable course work at an accredited college or university before applying for degree candidacy must have a secondary school record and acceptable scores on one of the three examinations listed in item 2 above.

4. Students who have completed 12 or more semester hours of acceptable course work at an accredited college or university must have maintained an overall quality-point index of 2.0 in course work; they must be in good standing as to scholarship and conduct and be eligible to return to the last previously attended institution in the same semester for which admission is sought to George Washington University. A student who has been academically dismissed or suspended more than twice is ineligible for consideration for at least five years from the date of the last suspension or dismissal.

REQUIRED CREDENTIALS

1. A transcript of secondary school work, or, for students who are not graduates of secondary schools, scores on the General Educational Development Test. Transcripts must be forwarded directly from the institution attended to the Office of Admissions. A transcript submitted directly by the student is not acceptable.

2. For applicants who have attended any college, university or other institution of higher learning, an official transcript forwarded to the Office of Admissions by each institution attended regardless of whether credit was earned or desired.

3. Scores on standardized examinations (ACT, SAT, CLEP, etc.) forwarded by the administering agency directly to the Office of Admissions.

4. Records from service schools.

* The College Entrance Examination Board test is preferred; however, the American College Testing battery (ACT) scores will be accepted.

ADVANCED TUITION DEPOSIT

After notification of acceptance, a $100 advanced tuition deposit will be required of all full-time undergraduate students, including those readmitted. This deposit is due May 1 for students entering in the fall semester, and December 15 for students entering in the spring semester. The deposit is credited toward tuition and is not refundable.

Admission as a Nondegree Student

A student who wishes to take individual courses in allied health programs without applying for degree candidacy must apply for admission to the University as an undergraduate unclassified student in the School of Medicine and Health Sciences. The Office of Allied Health and the chairman of the department offering the course shall determine whether admission will be granted to nondegree students. Credits earned as a nondegree student may be transferred to degree programs at the University provided the course(s) are applicable to the desired curriculum and the student meets the requirements of the degree program for which application is made.

Advanced Standing

Advanced standing may be awarded for course work taken at other accredited institutions at the college or university level or for nontraditional classroom or clinical experience. Students are reminded, however, that they must satisfy the residence requirement for their degree programs (see pages 60, 64) no matter how much advanced standing may be granted.

It is the responsibility of the student to have certified official transcripts of all course work taken at other institutions or the results of examinations sent by the issuing institution or agency directly to the Office of Admissions, George Washington University, Washington, D.C. 20052. If the applicant has fewer than 30 semester hours of acceptable credit (grades of *C* or better on academic work from an accredited institution) at the time the application is submitted, the applicant must have the secondary school record sent directly to the Office of Admissions from the school.

The University reserves the right to refuse credit for transfer in part or in whole, or to allow it provisionally. Credit so given may be withdrawn for subsequent poor work. No time limitation will be placed on the transfer of credits from other institutions, with the exception of the area of vocational competence (clinical applications as dictated by individual programs). Credit will not be granted for such work completed five or more years prior to application unless proficiency and/or continued maintenance of skills are demonstrated.

CREDIT FROM INSTITUTIONS OF HIGHER LEARNING

Unlimited advanced standing may be awarded for appropriate course work completed with a minimum grade of *C* or its equivalent at other accredited institutions of higher learning, provided that the course is applicable to or comparable with a course in the required curriculum, or that the degree program

to which the student has been admitted has provisions for elective credit toward which the credit for advanced standing may be applied. Although a grade of *D* is not acceptable for transfer, a course in which a student has received the grade of *D* may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it may not be repeated without the approval of the faculty advisor.

CREDIT FOR NONTRADITIONAL CLASSROOM OR CLINICAL EXPERIENCE

Assuming there is no duplication of course work earned, a maximum of 60 semester hours of advanced standing may be awarded on the basis of nontraditional classroom or clinical experience, by a combination of any of the methods listed below:

Credit from Service Schools.—A limited amount of credit may be assigned for selected service school instruction received since 1941. Veterans should submit to the Office of Admissions photostatic copies of their service school records, indicating courses successfully completed with sufficient identification of the course to locate it in the *Guide to Evaluation of Educational Experience in the Armed Forces.*

Special Departmental Examinations.—A student may request any department to offer the student a special examination covering the subject matter of any specific course. Approval of such a request is not automatically granted; the student must offer evidence of sufficient occupational or educational background to indicate a reasonable command of the subject matter. A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses. Assigning credit (or waiving a requirement) by special departmental examination will depend on the department's evaluation of the examination paper. These examinations will normally be of at least three hours' duration. A fee of $25 for each course examination is charged for preparation, administration, and grading of the examination.

Credit for College Entrance Examination Board College-level Examination Program (CLEP).—CLEP offers two types of examinations: General and Subject Examinations. CLEP General Examinations are offered in five areas: mathematics, social sciences, humanities, natural sciences, and English composition. CLEP Subject Examinations measure achievement of specific college-level courses and are offered in more than 20 subjects.

Upon admission to degree candidacy, credit is assigned for the General Examinations (with the exception of the English composition examination) passed at the 50th percentile or above (college sophomore norms). Credit is assigned for the Subject Examinations passed at the level recommended in the College Board model policy. Credit may not be earned by passing the examination after having taken the equivalent course. Arrangements for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board College-Level Examination Program, Box 592, Princeton, N.J. 08540.

Credit for New York State Board of Regent's Examination.—Applicants for degrees who present proper certification of award of a degree at the Associate's level from the New York State Board of Regents *may* be awarded a maximum of 60 semester hours of advanced standing.

Credit for Correspondence Courses.—A maximum of 30 semester hours o advanced standing *may* be awarded through the successful completion of appro priate correspondence courses offered by accredited colleges and universities

Credit through United States Armed Forces Institute (USAFI) Examinations —A maximum of 30 semester hours of advanced standing may be assigned fo approved United States Armed Forces Institute college-level examinations passed with satisfactory scores.

Credit for educational programs in industrial and other noncollegiate organi zations.—A maximum of 12 semester hours of advanced standing may be awarded for course work performed in noncollegiate programs using criteria developed by the American Council on Education and the New York State Board of Regents.

Currently registered degree candidates must obtain permission from the Office of Allied Health before registering to take examinations, correspondence courses, or courses at other accredited institutions.

Readmission

Students previously registered in the University who were not registered during the immediately preceding semester (summer sessions excluded), must apply for readmission. The final date for applying is the same as that for entering students (see page 46). Students who apply as degree candidates and who were previously registered as nondegree students, or who attended one or more institutions of higher learning during absence from the University, must have complete official transcripts sent to the Admissions Office of this University from each institution attended. Applications for readmission are considered on the basis of regulations currently effective.

The application fee is waived for students applying for readmission who were registered as degree candidates at the time of the last registration at the University and who have not since registered at another institution.

Students From Foreign Institutions

Application, required records, and scores on the *Test of English as a Foreign Language* (see below) should be received from international students not later than March 1.

REQUIRED RECORDS

Applicants must request all educational institutions attended to send *directly* to the Office of Admissions, George Washington University, Washington, D.C. 20052, official credentials listing subjects studied, grades received, examinations taken and degrees received. Certified copies of diplomas and certificates from secondary schools and all colleges and universities attended are required. Records of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

These documents should be in the language in which the institution keeps its official records. If they are in a language other than English, the copies which are sent should be accompanied by an English translation.

LANGUAGE TESTS

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* (TOEFL), and have the scores submitted to the Office of Admissions. Students are responsible for making arrangements for taking the test by addressing inquiries to TOEFL, Educational Testing Service, Princeton, N.J. 08540, U.S.A., well in advance of the beginning of the semester for which admission is sought. The test fee remitted with the application entitles the student to have the test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does not constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the Office of Admissions, George Washington University, Washington, D.C. 20052.

In addition to the TOEFL, an admitted student may be required to report to the Admissions Office to make arrangements for taking an English Placement Test for foreign students prior to registration. Results of this test will determine the courses the student will be permitted to register for in the program of study.

FEES AND FINANCIAL REGULATIONS FOR UNDERGRADUATE STUDENTS IN ALLIED HEALTH PROGRAMS

Fees paid by students cover only a portion of the cost of the operation of the University. Income from endowment funds, grants, and gifts from alumni and friends of the institution make up the difference.

The following fees and financial regulations were adopted for the 1978 summer sessions and the academic year 1978–79. (See page 53 for projected tuition increases for 1979–82.)

Tuition Fees

*Full-time on-campus program (12 or more semester hours), each semester	$1,500.00
Part-time on-campus program, for each semester hour	110.00
Summer Sessions, for each semester hour	105.00

University Center Fee (charged all students registered on campus)

For students registered for 11 or more semester hours on campus:	
Each semester	50.50
For students registered for less than 11 semester hours in a semester on campus:	
For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status:	
Each semester	4.75

*The annual tuition for the Nurse Practioner and Physician's Assistant Programs is $4,500.00, payable in three equal installments on or before registration for each semester. The Summer Sessions portion of the program is considered a full regular semester.

Additional Course Fees

In certain courses offered by Columbian College of Arts and Sciences, additional fees such as laboratory and material fees, are charged as indicated in the course descriptions in the *Undergraduate and Graduate Bulletin*. These fees are charged by semester and, unless otherwise indicated, may be defrayed in two payments when tuition is paid in this manner. Breakage of apparatus is charged against the individual student. When breakage is in excess of the normal amount provided for in the laboratory fee, the individual student will be required to pay such additional charges as are determined by the department concerned.

Graduation Fees

Associate in Science	$10
Bachelor of Science	25

Residence Hall Fees (see pages 15–16)

Special Fees and Deposits

*Application fee	$10
Advanced tuition deposit, nonrefundable, charged each entering or readmitted full-time undergraduate student	100
Housing deposit, nonrefundable, charged each applicant for residence hall space	100
Admission tests (when required)	6.00–15
Late-registration fee, for failure to register within the designated period	15
Late-payment fee, for failure to make payments when due (see "Payment of Fees," pages 53–54)	15
Financial reinstatement fee, for reinstatement after financial encumbrance for non-payment of fees (see "Payment of Fees," pages 53–54	35
Returned check fee, charged a student whose check is improperly drafted, incomplete, or returned by the bank for insufficient funds or for any other reason	15
Continuous Registration fee, to maintain "continuous registration" status during any semester of absence from the University or after completion of tuition requirements†—due and payable on the official days of registration, nonrefundable	115
Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both	25
For each examination to qualify for advanced standing and for each special examination	5
English test for foreign students (when required)	5
Laboratory checkout fee, for failure to check out of Chemistry laboratory by the date deadline set by the instructor‡	10

* This fee will be increased to $15 beginning with applications for admission to the Summer Session 1979.

† Payment of the continuous registration fee entitles the student who is granted leave of absence to return and continue work toward a degree under the academic requirements which were in force at the time of the student's first registration. The continuous registration fee does not apply toward residence requirements for the degree; should a student add a course after payment of the continuous registration fee for the term, the fee will be applied toward tuition charges. This fee does not apply to students granted military leave.

‡ A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next laboratory period.

Transcript fee, for each transcript of record	$2.00
If two or more transcripts are requested at the same time, fee for the first two copies is $2 each, fee for each additional copy	.50
Replacement of lost or stolen picture identification card	2.00

Registration for on-campus courses in the University entitles each student to the following privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

Projected Tuition and Fee Increases 1979–82

So that students and their parents may plan more realistically for a total four-year period, tuition increases for the academic years 1979–80, 1980–81, and 1981–82 have been estimated as follows:

*Increase by year (full-time undergraduate students):

1979–80	$200.00
1980–81	200.00
1981–82	200.00

The University Center fee will be increased for the 1979 summer sessions and the academic year 1979–80. For students taking 11 or more semester hours, the fee will be $55.50 per semester. Students taking less than 11 semester hours will pay $5.25 per semester hour.

Increase by semester hour (graduate and part-time undergraduate students):

1979–80	$7.00
1980–81	8.00
1981–82	8.00

It is not possible to project future economic data with certainty. Increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obligated to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable and significant increases in tuition in excess of the above limits may be required.

Payment of Fees

No student is permitted to complete registration or attend classes until all charges are paid. Tuition and fees for each semester are due and payable in full

*The Summer Sessions portions of the Nurse Practitioner and Physician's Assistant Programs are considered as full semesters in the setting of tuition; therefore, students enrolled in these programs should allow for an additional tuition increase of $100.

at the Office of the Cashier at the time of each registration. Checks should b made payable to George Washington University, with the student identific tion number in the upper left-hand corner.

The Student Accounts Office has responsibility for billing and maintainin student accounts for tuition, various fees, and room and board charges. A stu dent registered for six semester hours or more may sign a deferred payment co tract with the Student Accounts Office at the time of each registration permi ting payment of one-half of the total tuition and fees (except for fees payable advance) at the time of registration, and the remaining half on or before Oc tober 25, 1978 (for the fall semester), and March 7, 1979 (for the spri semester). No deferred payment is permitted for the summer session. Interes at the rate of eight per cent per annum on the unpaid balance will be charge from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, governme tuition contracts, or other forms of tuition awards are not permitted to sign d ferred payment contracts unless the total tuition and fee charges exceed th value of the tuition awards by $750.00 or more. Under such circumstances th student may be permitted to pay one-half of the amount due from the studen at the time of registration and to defer the balance by signing a deferred pay ment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of eight per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered the student forfeits rights to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students registered for credit.

Prepaid and Deferred Payment Plans

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

Withdrawals and Refunds

Applications for withdrawal from the University or for change in class schedule must be made in writing to the Office of Allied Health. Notification to

instructor is not an acceptable notice (see "Withdrawal," page 57).

In authorized withdrawals and changes in schedule, cancellations of semester tuition charges and fees will be made in accordance with the following schedule for the fall and spring semesters:

1. *Complete withdrawal from the University**:

FALL SEMESTER

Withdrawal dated on or before September 8, 1978	90 per cent
Withdrawal dated September 11 to September 22, 1978	75 per cent
Withdrawal dated September 25 to October 6, 1978	50 per cent
Withdrawal dated after October 6, 1978	none

SPRING SEMESTER

Withdrawal dated on or before January 19, 1979	90 per cent
Withdrawal dated January 22 to February 2, 1979	75 per cent
Withdrawal dated February 5 to February 16, 1979	50 per cent
Withdrawal dated after February 16, 1979	none

2. For a *change in status from full-time to part-time student* or for *partial withdrawal by a part-time student*, the above schedule applies to the difference in charges between the original program and the adjusted program continuing in effect.
3. A student enrolled in an undergraduate full-time program who drops or adds a course and continues to be in a full-time program will have no financial adjustments of tuition made other than those involving course fees.
4. Regulations governing student withdrawals as they relate to residence hall and food service charges are contained in the specific lease arrangements.

In no case will tuition be reduced or refunded because of absence from classes.

Payment applies only to the semester for which a registration charge is incurred and will not be credited to another semester (exception: students granted military leave, see page 58).

Authorization to withdraw and certification for work done will not be given a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can make banking arrangements in the community.

REGULATIONS FOR UNDERGRADUATE STUDENTS IN ALLIED HEALTH PROGRAMS

Attendance

A student may not attend classes until registration is completed and fees due are paid. A student may attend only those classes for which registered. Regular attendance is expected. A student may be dropped from any course for undue absence.

* Regulations concerning withdrawal and refunds for the summer sessions are stated in the *Summer Sessions Schedule of Classes*. The refund schedule for the 1979–80 academic year is expected to correspond approximately to the dates given here.

Scholarship Requirements

A student who fails to maintain the scholarship requirements of the School Medicine and Health Sciences may be dismissed from the University.

GRADES

Grades are mailed to the student through the Office of the Registrar at the cl of each semester. They are not given out by instructors.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfacto *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal. In cert courses, an alternate grading system of *CR* (Credit) and *NC* (No Credit) m be used. Except for courses which specifically state that repetition for credi permitted, a candidate for a degree at this University may not repeat for cre a course in which a grade of *D* or better was received, unless required to so by the department concerned. A written statement to this effect must be s mitted to the Registrar by the appropriate department chairman.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Whenever a grade has not been assigned, the symbol *I* (Incomplete), t symbol *W* (Authorized Withdrawal) or the symbol *F* (Unauthorized W drawal) will be recorded. The symbol *I* indicates that a satisfactory explanat has been given the instructor for the student's inability to complete the requir work of the course. At the option of the instructor, the grade of *I* may be re corded if a student, for reasons beyond the student's control, is unable to com plete the work of the course, and if the instructor is informed of, and approv such reasons before the date when grades must be reported. The grade may used only if the student's prior performance and class attendance in the co have been satisfactory. Any failure to complete the work of a course which not satisfactorily explained to the instructor before the date when grades m be turned in will be graded *F*. If acceptable reasons are later presented to t instructor, the instructor may initiate an appropriate grade change. A grade *I* automatically becomes a grade of *F* one calendar year after the date of t last class meeting in the semester for which the grade of *I* was assigned.

THE QUALITY-POINT INDEX

Scholarship is computed in terms of the quality-point index, obtained by div ing the number of quality points by the number of semester hours for wh the student has registered, both based on the student's record in this Univ sity. Quality points are computed from grades as follows: *A*, four points three points; *C*, two points; *D*, one point; *F*, no points, for each semester ho for which the student has registered. Courses in which the grades of *W* or are assigned are not considered in determining the index, except that a cour in which the grade of *I* has been assigned will be considered when a form grade has been recorded. Grades earned at other institutions are not co sidered in computing the quality-point index.

DEAN'S HONOR LIST

Students who achieve a quality-point index of 3.50 or higher are placed on th Dean's Honor List for that semester. Appearance on the list is limited to fo

time students registered for a minimum of 12 semester hours and part-time students registered for a minimum of 12 semester hours over two consecutive semesters, which may include a summer term.

PROBATION

A student who has attempted a minimum of 12 semester hours of course work and whose cumulative quality-point index is below 2.00 is placed on probation for the period in which he or she next attempts 12 additional semester hours of work. A student whose attendance or conduct has been unsatisfactory is placed on disciplinary probation for the period in which he or she next attempts 12 additional semester hours of work.

SUSPENSION

A student whose cumulative quality-point index remains below 2.00 after a 12-semester-hour period of probation is suspended.

A student suspended for poor scholarship may not register for course work, even as an auditor. The student may apply for readmission after the lapse of either the fall or spring semester following suspension. Evidence must then be presented to the chairman of the department concerned demonstrating a better qualification to pursue college-level course work. A student suspended twice for poor scholarship may not be readmitted after the second suspension.

Withdrawal

Withdrawal from a course or from the University requires the permission of the Office of Allied Health. Permission to withdraw from the University will not be granted a student who does not have a clear financial record (see "Withdrawals and Refunds," pages 54–55).

All charges for courses dropped without the approval of the Office of Allied Health must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

Changes in Program of Study

Changes within the School of Medicine and Health Sciences' Allied Health Programs.—A student may not substitute one course for another, drop courses (see "Withdrawal," above), change status from credit to audit or audit to credit without the approval of the Office of Allied Health.

Change from one section to another of the same course may be made with the approval of the Office of Allied Health and the chairman of the department concerned.

Change from one area of concentration to another within the School of Medicine and Health Sciences may be made with the approval of the Office of Allied Health and the chairman of the department concerned. All requirements of the course of study to which the change is made must be met.

Transfer within the University.—Application for transfer to another college, school, or division must be made to the Office of Admissions. A maximum of 45 semester hours earned in the Division of University Students may be applied toward a bachelor's degree in the School of Medicine and Health Sciences.

Credit

Credit is given only after registration for a course and satisfactory completi of the required work, or upon the assignment of advanced standing in accor ance with the regulations of the several colleges, schools, and divisions.

Auditing.—A person who has been admitted to the University may be reg tered, with the permission of the instructor, as an auditor in a class (no ac demic credit). An auditor is not required to take active part or to pass exam nations. A student who takes a course as an auditor may not repeat it later f credit.

Post-Admission Transfer Credit

A student who plans to attend another institution and apply credit so earn toward graduation from this University must first secure the written approval the Office of Allied Health. In no event will credit in excess of what mig be earned in a similar period in this University be recognized.

Balance Sheet

Sometime during each undergraduate student's first semester, the Office Allied Health will issue a balance sheet showing the amount of work com pleted and the requirements remaining to be met for the degree. A secon balance sheet is issued only if the student changes major or degree objective

Transcripts of Record

Official transcripts of student records are issued on request of the student former student who has a clear financial record. A fee of $2 is charged for eac transcript. When more than two transcripts are ordered at the same time, a $ fee is charged for each of the first two transcripts and a $.50 fee is charged fo each additional transcript.

Continuous Registration

Degree candidates are expected to maintain continuous registration until *all* de gree requirements are satisfied. Students who have completed course registra tion must maintain continuous registration by paying the "continuous registra tion" fee (see page 52). By failing to register for one semester or more, th student breaks registration and must be readmitted (see "Readmission," pag 50). A "readmitted student" is subject to the regulations and requirements force at the time of readmission.

Students must be registered during the summer if they are taking courses are expecting to be graduated at the end of the Summer Sessions.

Military Leave

A student called to active duty may be granted military leave for the period active duty, upon presentation to the dean of a copy of the military orders and a petition for such leave. The maintenance of "continuous registration" is not required of the student on military leave; however, the student must apply for readmission to the University well in advance of the semester of expected return Payments for tuition and fees which are not refunded to the student at the tim

military leave is granted will be maintained as a deferred credit for the student's account and used upon return to the University.

Graduation Requirements

Degrees are conferred in February, May, and September.

To be recommended by the Faculty for graduation a student must have met the admission requirements of the college or school in which registered; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session at the close of which the degree is to be conferred.

Application for Graduation.—An "Application for Graduation" form *must* be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the senior or final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal convocation) dated September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions. If they wish, such students may participate in the Winter Convocation.

Scholarship.—The student must meet the scholarship requirements for the particular degree for which registered.

Curriculum.—Minimum curriculum requirements for each degree are stated on pages 60 and 64.

Residence.—A minimum of 18 semester hours of course work in the area of concentration for the Associate in Science degree and a minimum of 30 semester hours of course work in the area of concentration for the Bachelor of Science degree must be completed while registered in the School of Medicine and Health Sciences. This requirement applies to students transferring within the University as well as to students transferring from other institutions.

Attendance and Conduct.—The University reserves the right to refuse to confer a degree upon a candidate whose attendance or conduct has been unsatisfactory.

With Distinction

In all undergraduate divisions of the University a baccalaureate degree may be conferred "With Distinction," at the discretion of the faculty, if a student meets the specific requirements of the college or school in which enrolled.

Students in the Allied Health programs must have a quality-point index of 3.50 or higher in all course work taken at this institution. To be eligible a student must have completed at this institution at least one-half of the courses required for the degree.

FINANCIAL AID

For full-time undergraduate students, George Washington University has a program of financial assistance consisting of scholarships, loans, grants, part-

time employment, or any combination of these resources. The University par
ticipates in the National Direct Student Loan, Supplemental Educational Op
portunity Grant, and College Work-Study programs. Financial aid is awarde
on the basis of the student's scholastic record, financial need, and qualitie
of leadership. Complete information concerning financial assistance is ava
able from the Office of Student Financial Aid, George Washington University
Washington, D.C. 20052.

REQUIREMENTS FOR THE DEGREE OF ASSOCIATE IN SCIENCE

The satisfactory completion of a minimum of 60 semester hours of course wo
is required for the degree of Associate in Science; however, some departmen
may set the requirements above the minimum. The course work must be di
tributed as follows:

1. **Human Competence**
   A minimum of six semester hours in English Composition (Engl 9 or 1
   and 11 or 12), plus a minimum of six semester hours of meaningful intr
   tion into the humanities, social studies, or mathematics.

2. **Subject Competence**
   The number of semester hours required depends on the student's specif
   area of concentration. However, students must elect courses related
   allied health sciences in biological sciences, mathematics, or physic
   sciences. (Students may not use the same mathematics courses to satis
   both the human competence [see above] and subject competence re
   quirements.)

3. **Vocational Competence**
   A minimum of 30 semester hours in vocational competence skills relat
   to the area of concentration.

4. **Elective**
   The number of elective hours depends on the number of semester hours
   specific required courses the student has in the selected program of stud
   in some programs the student may be allowed to choose electives, but
   others the student may be required to elect specific courses.

Students who plan to pursue a bachelor's degree are advised to plan th
associate's degree program so that they will satisfy the prerequisites to the
gree of their choice.

Scholarship Requirements

An over-all quality-point index of 2.0 is required for course work leading
the degree of Associate in Science. A quality-point index of 2.50 is required
course work in the student's area of concentration. See page 56 for exp
nation of the grading system and the quality-point index.

Residence Requirement

A minimum of 18 semester hours of course work in the area of concentrati
must be satisfactorily completed in residence in the School of Medicine a
Health Sciences.

MEDICAL LABORATORY TECHNIQUE PROGRAM

The program of study leading to the degree of Associate in Science with a concentration in medical laboratory technique is offered only to military students off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 46–47. Mature students who do not meet these requirements *may* be considered for degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50. The qualifying course work must include nine semester hours in biological sciences, chemistry, or mathematics, and six semester hours in at least two other areas.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 61 semester hours of course work is required:

Nonclinical Course Work	**Semester Hours**
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Math 3 and 6 (or equivalent)	6
Chem 9 or 11 (or equivalent)	4
Chem 8 (or equivalent)	2
	18
Clinical Course Work	
Path 13, 14, 15, 16, 17, 18, 19, and 20	43
Total	61

NUCLEAR MEDICINE TECHNOLOGY PROGRAM

The program of study leading to the degree of Associate in Science with a concentration in nuclear medicine technology is offered both on and off campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pages 46–47. Applicants must be at least 18 years of age by the time of first registration. A personal interview or a letter of recommendation may be required for some students. Mature students who do not meet the standard requirements may be considered for admission to degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 60 semester hours of course work is requir
Bioc 101 and HCS 110 and 111, or their equivalents, are prerequisite to
other courses in nuclear medicine technology.

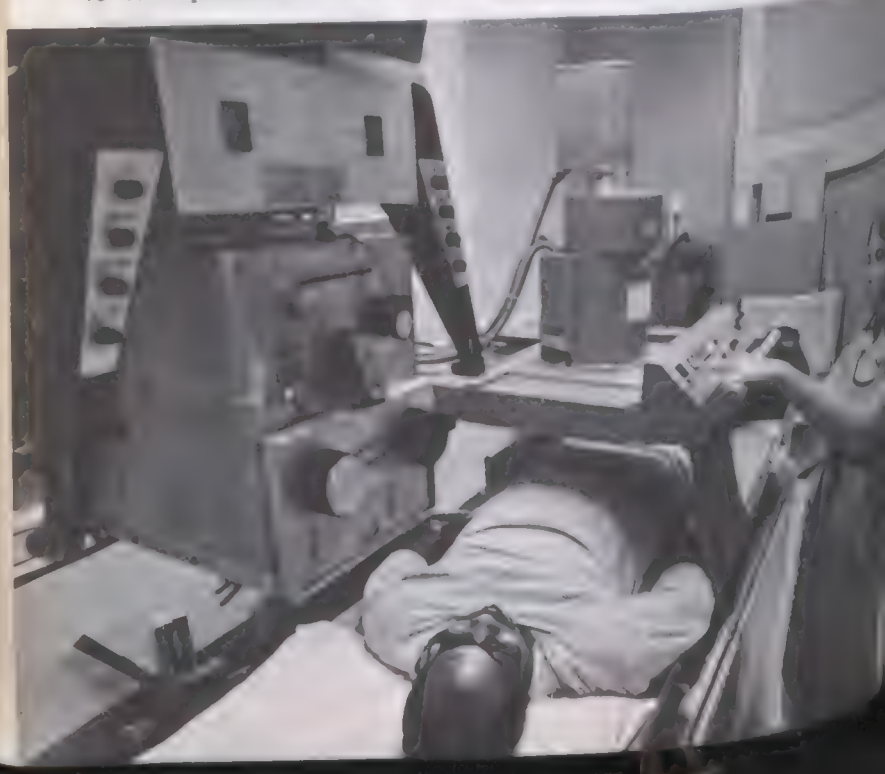
	Semes Hour
Courses Outside the Area of Concentration	
Engl 9 or 10 and 11 or 12 (or equivalent)	
Social Studies (as determined by the faculty advisor; Psyc 1 recommended)	
Humanities (selected from art, music, philosophy, or religion)	
	1
Area of Concentration	
Rad 43, 44, 55, 56, 57, 58, 59, 65, 66, 72, 75, 81, 82, 93, 94, 98	
	6
Total	

RADIOLOGIC TECHNOLOGY PROGRAM

The program of study leading to the degree of Associate in Science with a co
centration in radiologic technology is offered only to military students
campus.

ADMISSION TO DEGREE CANDIDACY

General requirements for admission to degree candidacy are stated on pa
46–47. A personal interview or a letter of recommendation may be required



some students. Mature students who do not meet the standard requirements may be considered for admission to degree candidacy after the satisfactory completion of a probationary period of 15 semester hours of course work taken in residence at George Washington University with a minimum quality-point index of 2.50.

DEGREE REQUIREMENTS

The satisfactory completion of 61 semester hours of course work is required:

Courses Outside the Area of Concentration	Semester Hours
Engl 9 or 10 and 11 or 12 (or equivalent)	6
Social Studies (as determined by the faculty advisor)	3
Humanities (as determined by the faculty advisor)	3
	12
Area of Concentration	
Rad 40, 41, 42, 50, 51, 60, 61, 62, 70, 71, 80, 90, 95, 96, 97, 99	49
Total	61

REQUIREMENTS FOR THE DEGREE OF BACHELOR OF SCIENCE

The satisfactory completion of a minimum of 120 semester hours of course work is required for Bachelor of Science programs; however, some departments may set the requirements above the minimum. The course work must be distributed as follows:

1. **Human Competence**

   A minimum of six semester hours in English Composition (Engl 9 or 10, and 11 or 12) plus 24 semester hours of meaningful initiation into any two of the three general areas of the humanities, social studies, or mathematics.

2. **Subject Competence**

   A minimum of 30 semester hours of didactic information related to allied health sciences. This requirement may include the biological sciences, mathematics, or the physical sciences.

3. **Vocational Competence**

   A minimum of 60 semester hours in vocational competence skills related to the area of concentration.

Scholarship Requirements

An over-all quality-point index of 2.0 is required for course work in programs leading to the Bachelor of Science degree. A quality-point index of 2.50 is required for designated course work in the student's area of concentration. See page 56 for explanation of the grading system and the quality-point index.

Residence Requirement

A minimum of 30 semester hours of course work in the area of concentrat must be satisfactorily completed in residence in the School of Medicine Health Sciences.

HEALTH SCIENCES PROGRAM

The Bachelor of Science degree program in Health Sciences is currently offe to Advanced Hospital Corps students off-campus.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is requi for the degree of Bachelor of Science in Health Science, distributed as follo

Human Competence—30 semester hours required:

6 hours in English composition
3 hours in psychology
21 hours in the humanities and social studies

Seme Ho

Subject Competence—30 semester hours required:

*HCS 010:	Anatomy and Physiology
*HCS 016:	Clinical Laboratory Techniques and Procedures
*HCS 015:	Pharmacology and Toxicology
*HCS 119:	Patient Care I
*HCS 116:	Medical Terminology

Plus an additional 16 semester hours of didactic information in the biol cal sciences, mathematics, and chemistry.

Vocational Competence—60 semester hours required:

Course work directly related to student's major area of concentration:

*HCS 092:	Medical Material Management
*HCS 093:	Health Systems Administration
*HCS 125:	Manifestations of Disease
*HCS 126:	Manifestations of Disease
*HCS 102:	Food and Water Sanitation
*HCS 022:	Introduction to Epidemiology
*HCS 067:	Disaster Sanitation
*HCS 068:	Environmental Sanitation
*HCS 096:	Clinical Experience
**HCS 180:	Practicum in Environmental Health
**HCS 175:	Primary Care Preceptorship

MEDICAL TECHNOLOGY PROGRAM

The satisfactory completion of 120 semester hours of course work is requi for the degree of Bachelor of Science in the field of medical technology.

* Area of concentration—This requirement fulfilled by successful completion of Advanced Ho Corps School (NEC8425).

** A corresponding number of credits for approved course work in a directly applicable health field may be substituted.

RESIDENCE REQUIREMENT

A minimum of 60 semester hours must be spent in residence for the degree of Bachelor of Science in the field of medical technology, including the 12-month medical technology program at the University Hospital in the fourth year (Path 121, 122, 123, 124, 125, 126, 127, 128).

CURRICULUM

1 First Two Years

		Semester Hours
Engl:	Engl 9 or 10 and 11 or 12	6
Humanities:	Six semester hours selected from one of the following combinations: Art 31–32; Art 71–72; Engl 51–52; Engl 71–72; Engl 191–92; Mus 3 and 4; Rel 9 and 10; or Rel 59 and 60	6
Math:	Math 3, 6	6
	NOTE: the Math 3 requirement may be satisfied by offering two years of high school algebra acceptable for admission; the Math 6 requirement may be satisfied by offering one-half year of high school trigonometry acceptable for admission.	
Science:	BiSc 11–12, 111	12
	Chem 11–12, 22	12
Social Studies:	Six semester hours selected from one of the following combinations: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40; Hist 71–72; PSc 1 and 2; PSc 2 and 3; or Soc 1 and 2	6
Elective:	Courses in the humanities and social studies	12
		60

2 Junior Year

Chem 50:	Introduction to Organic Chemistry	4
BiSc:	Four semester hours selected from the following	4
BiSc 104:	Comparative Vertebrate Anatomy	
and BiSc 127:	Genetics	
BiSc 128:	Genetics Laboratory	
BiSc 148:	Histology	
BiSc 163:	Human Physiology	
BiSc 164:	Human Physiology Laboratory	
BiSc 165:	Vertebrate Physiology	
and Electives:	Nonscience courses	22
		30

3 Senior Year

Path 121:	Introduction to Medical Technology	4
Path 122:	Clinical Chemistry Lecture	3
Path 123:	Clinical Microbiology Lecture	2
Path 124:	Blood Bank Lecture	1
Path 125:	Clinical Hematology Lecture	2

Path 126:	Selected Topics in Laboratory Medicine	
Path 127:	Clinical Laboratory Rotation	
Path 128:	Clinical Laboratory Rotation	
	Total	

The fourth-year courses constitute the major. Each candidate must make app
cation to take the 12-month medical technology program at the Univers
Hospital; this should be done early in the third year. Although admission to t
degree program does not assure acceptance into the medical technology p
gram at the Hospital, George Washington University students are given pref
ence.

The Bachelor of Science degree in the field of medical technology is a
offered to military personnel off-campus. Students must have completed at le
90 semester hours of course work equivalent to the first three years of the
campus curriculum before being considered for admission to the senior year
campus.

Military students in the off-campus program must complete the follow
courses with a quality-point index of 2.50 or better.

Path 100:	Clinical Chemistry Lecture
Path 102:	Clinical Chemistry Laboratory
Path 104:	Clinical Microbiology Lecture
Path 106:	Clincal Microbiology Laboratory
Path 108:	Blood Bank Lecture
Path 110:	Blood Bank Laboratory
Path 112:	Hematology Lecture
Path 114:	Hematology Laboratory

PHYSICIAN'S ASSISTANT PROGRAM

The program leading to the degree of Bachelor of Science with designation
Physician's Assistant requires the satisfactory completion of 120 semester ho
of course work.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pa
46-47. In addition, three letters of recommendation, a personal interview,
year (2,000 hours) of patient-care experience, and satisfactory completion
a course in general chemistry are required.

SCHOLARSHIP REQUIREMENTS

Scholarship requirements are stated on page 63. Candidates for the deg
of Bachelor of Science with a designation as Physician's Assistant must m
tain an overall quality-point index of 2.00 for course work taken in the
sician's Assistant program. A quality-point index of 2.50 is required for

courses designated in the core curriculum (area of concentration). Each student must complete and pass all courses for which registered in any given semester before being allowed to advance to the next semester.

RESIDENCE REQUIREMENT

A minimum of 75 semester hours in the preclinical and clinical portion of the Bachelor of Science degree curriculum must be completed in residence at the School of Medicine and Health Sciences.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the Bachelor of Science degree with a designation as a Physician's Assistant, distributed as follows:

Human Competence—30 semester hours required:
6 hours in English composition
24 hours in the humanities and social studies

Subject and Vocational Competences—90 semester hours required:

		Semester Hours
Basic Health Sciences		
HCS 110:	Anatomy for New Health Practitioners	3
Bioc 111:	Biochemistry for Allied Health Sciences	3
Micr 128:	Microbiology for New Health Practitioners	2
Path 129:	Pathology for New Health Practitioners	3
Path 152:	Introduction to Basic Laboratory Medicine	3
Phar 158:	Pharmacology for New Health Practitioners	2
Phyl 111:	Physiology for New Health Practitioners	3
Basic Clinical Sciences		
HCS 109:	Human Behavior I	2
HCS 119:	Patient Care I	1
*HCS 125:	Manifestations of Disease	5
*HCS 134:	Patient Care II	2
HCS 137:	Issues in Health Care	2
HCS 140:	Clinical-Pathological Coorelation	2
HCS 145:	Primary Care and Therapeutics	3
HCS 146:	Surgical and Diagnostic Procedures	1
HCS 147:	Introduction to Radiology	1
HCS 148:	Introduction to Electrocardiography	1
Clinical Clerkship		
*HCS 160:	Medical Inpatient	5
*HCS 163:	Medical Outpatient	5
HCS 166:	Surgical Inpatient	5
*HCS 169:	Obstetrics and Gynecology	5
*HCS 172:	Pediatric Outpatient	5
HCS 175:	Primary Care Preceptorship	12
HCS 178:	Emergency Medicine	5
HCS 198:	Psychiatry	5
HCS 199:	Independent Study	5

* Designates area of concentration course work which must be completed with a cumulative quality point index of 2.50.

Other Required Courses

HCS 113: Medicine and Society .....
HCS 116: Medical Terminology .....

CERTIFICATE

A certificate is awarded upon completion of the 90-semester-hour sequence required and elective courses in health care sciences.

NURSING ANESTHESIA PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pa 46–47. In addition, candidates for the degree must also fulfill the follow requirements:

1. They must have graduated from a state-approved school of nurs Nurses with an Associate degree may be accepted into the program a completing a minimum of twelve months of practical experience in crit care nursing.
2. They must be licensed as registered professional nurses in at least state, U.S. territory, or the District of Columbia.
3. They must satisfy the requirements of the school of anesthesia at one the affiliated hospitals.

ADVANCED STANDING

The general provisions for awarding of advanced standing are stated on p 48. In addition, the following specific criteria apply for the Bachelor of Scie degree in Nursing Anesthesia.

1. Students who are graduates of two- or three-year nursing school progra and who have had a minimum of twelve months of practical exp ence in critical-care nursing *may* receive up to 45 hours of advan standing credit in Nursing.
2. Students who have earned a B.S. degree in Nursing *may* receive up to hours of advanced standing credit in Nursing.
3. Certified Registered Nurse Anesthetists will receive credit in Nursing an individual basis. Students seeking award of advanced standing cr on the basis of anesthesia work experience must provide evidence of d onstrated clinical competence.

Students who graduated from nursing school more than five years ago have not been active in nursing during the last five years may be require take National League of Nursing or New York State Board of Regents exa nations.

SCHOLARSHIP

Students must maintain an overall quality point index of 2.50 on all n anesthesia courses (area of concentration). Any student who does not m

tain a 2.50 average will be required to take additional course work in order to obtain a minimum 2.50 average on the 30 hours of required courses.

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is required for the Bachelor of Science degree in Nursing Anesthesia, distributed as follows:

1. Thirty semester hours of course work in the area of human competence, including at least six semester hours in English (Engl 9 or 10, and 11 or 12), three semester hours in Psychology (Psyc 001), and 21 semester hours of meaningful initiation into two of the following areas—social studies, humanities, and mathematics.
2. Thirty semester hours of course work in the area of subject competence, including course work in the biological and physical sciences. (Note: Advanced standing credit awarded for nursing school experience may be used to fulfill this requirement.)
3. Sixty semester hours of course work in the area of vocational competence skills directly related to nursing anesthesia, consisting of the following courses:

YEAR I

		Semester Hours
Phar 021, 022:	Chemistry and Physics of Anesthesia	6
Phar 110, 111:	Pharmacological Basis of Anesthesia	8
Anes/Phar 195:	Electronics for Medical Personnel	2
Anes/Phar 191:	Respiratory Care	3
Anat 115:	Anatomy for Nurse Anesthetists	3
Phyl 111:	Physiology for New Health Practitioners	3
HCS 134:	Patient Care II	2
Anes 198:	Pathological Physiology and Anesthesia	3
		30

YEAR II

Anes/Phar 193:	Methods and Procedures in Anesthesia	4
Anes 194:	Principles of Clinical Anesthesia	26
		30

All students must complete Year I course work, in residence, with an overall quality-point index of 2.50 or better. Certified Registered Nurse Anesthetists may waive Year II clinical course work on the basis of documented evidence of clinical competence after successful completion of Year I course work.

CERTIFICATE

A certificate is awarded upon completion of the 60-semester-hour sequence of required courses in the nursing anesthesia program.

NURSE PRACTITIONER PROGRAM

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 46–47. Candidates for the degree of Bachelor of Science with designation as

Nurse Practitioner must also fulfill the following requirements:

1. They must have been graduated from a school of nursing with an over
quality-point index of at least 2.00 or the equivalent.
2. They must be licensed as registered nurses in at least one state or the
trict of Columbia.
3. They must have had a minimum of three years' experience in nur
practice in hospital and ambulatory settings.
4. They must have three letters of recommendation forwarded from emp
ers, supervisors in the health field, and/or acquaintances.

Preference will be given to applicants who have made arrangements wi
physician or an institution to be employed as a nurse practitioner.

SCHOLARSHIP

The grades of *CR* (Credit) and *NC* (No Credit) are given. A student who
received a grade of *NC* in any of the preclinical courses will be ineligibl
continue in the clinical portion of the program until the course has been
peated and a grade of *CR* has been received. Progress through each portio
the clinical phase will be evaluated by the faculty in charge of that partic
rotation.

ADVANCED STANDING

General provisions for advanced standing are listed on page 48. In addi
students may receive up to 45 semester hours of advanced standing for
cessful completion of nursing school. No advanced standing will be gra
in the required 60-semester-hour area of concentration.

RESIDENCE REQUIREMENT

A minimum of 45 semester hours of course work in the area of concentra
must be completed in residence in the School of Medicine and Health Scien

DEGREE REQUIREMENTS

The satisfactory completion of a minimum of 120 semester hours is req
for the degree of Bachelor of Science with designation as a Nurse Practitio
distributed as follows:

Human Competence—30 semester hours required:

6 semester hours in English composition
24 semester hours in the humanities and social studies, which must include:
HCS 109: Human Behavior
HCS 137: Issues in Health Care

Subject and Vocational Competences—90 semester hours required:

Clinical Health Sciences

HCS 110: Anatomy for New Health Practitioners
HCS 119: Patient Care I
HCS 125: Manifestations of Disease
HCS 134: Patient Care II
HCS 142: Nurse Practitioner Seminar I
HCS 143: Nurse Practitioner Seminar II

HCS 144:	Nurse Practitioner Seminar III	1
HCS 145:	Primary Care and Therapeutics	3
HCS 147:	Radiology	1
Micr 128:	Microbiology for New Health Practitioners	2
Path 129:	Pathology for New Health Practitioners	3
Path 152:	Introduction to Basic Laboratory Medicine	3
Phyl 111:	Physiology for New Health Practitioners	3

Clinical Rotations

HCS 153:	Gynecology Outpatient	3
HCS 157:	Primary Care Preceptorship	6
HCS 165:	Medical Outpatient	arr.
HCS 171:	Pediatric Outpatient	3
HCS 179:	Emergency Medicine	2

Electives

HCS 193:	Issues in Aging	3
HCS 154:	Independent Study	arr.

A minimum of 30 semester hours of course work in the physical, natural, and mathematical sciences is required. Advanced standing awarded for nursing school experience may be used to fulfill this requirement.

CERTIFICATE

Nurse Practitioner certification will be granted to those students who meet the requirements for admission to the degree program and who complete the 45-semester-hour area of concentration.

RADIOLOGIC SCIENCES AND ADMINISTRATION PROGRAM

The program leading to the degree of Bachelor of Science in the field of Radiologic Sciences and Administration requires the satisfactory completion of a minimum of 120 semester hours of course work. This program is designed for registered technologists in either diagnostic radiologic technology, nuclear medicine technology, or radiation therapy technology who wish to continue their education at the baccalaureate level.

ADMISSION TO DEGREE CANDIDACY

The general requirements for admission to degree candidacy are stated on pages 46–47. In addition, students applying to the program must be registered technologists or registry-eligible within the first academic semester. A personal interview or a letter from the principal or dean of the school previously attended is required. Students whose previous schooling suggests inadequate preparation in physics and mathematics may be required to complete successfully Rad 92 before placement in either Rad 167 or Rad 171.

ADVANCED STANDING

General provisions for advanced standing are stated on page 48. Students may be granted up to 48 semester hours of advanced standing credit if (1) they have completed study within the last five years, with a quality-point index of at least 2.50 or a grade average of at least 80 per cent, at a radiologic

technology, nuclear medicine technology, or radiation therapy technology sch
that is accredited by Joint Review Committee on Education Programs in Ra
logic Technology or Nuclear Medicine of the Council on Medical Educatio
the American Medical Association, or (2) they are certified as American Re
tered Radiologic Technologists, Nuclear Medicine Technologists, or Radia
Therapy Technologists.

SCHOLARSHIP

Scholarship requirements are stated on page 63.

DEGREE REQUIREMENTS

Human Competence

A minimum of 30 semester hours is required, including BAd 102, 105; En
or 10 and 11 or 12; Psyc 1; Soc 1. Recommended electives include Engl
Hum 26; Psyc 151; Soc 129; SpDr 111, 121; or other courses in the hum
ties or social sciences.

Subject and Vocational Competences

A total of 92 semester hours is required. Of these, a maximum of 48 seme
hours is allowed for course work in an American Medical Association appro
program in either diagnostic radiologic technology, nuclear medicine technol
or radiation therapy technology. The remaining 44 semester hours consis
the following required courses:

Se
Ho

1. **Radiologic Sciences**

CIEng 101:	Practical Computing for New Health Practitioners	
Rad 167:	Radiation Physics and Safety I	
Rad 171:	Radiological Electronics and Engineering	
Rad 175:	Physics of Radiological Imaging,	
Rad 176:	Physics of Nuclear Medicine,	
or Rad 177:	Dosimetry in Radiation Therapy	
Rad 190:	Radiobiology	
Rad 195:	Directed Study in Radiation Physics	

2. **Radiologic Administration**

HCA 142:	Financial Management in Health Care Institutions	
HCA 153:	Survey of Health Care Organization	
HCA 154:	Introduction to Hospital Management and Procedures	
HCA 170:	Quantitative Methods in Health Care Administration	
Psyc 144:	Personnel and Industrial Psychology	
Rad 140:	Radiology Administration	
Rad 145, 147, or 149:	Administrative Project	
Rad 150:	Radiology Senior Study	
Soc 124:	Medical Sociology	
	Total	

Required or Recommended Courses in Allied Health Programs Offered in Other Divisions of the University

The following courses are offered by Columbian College of Arts and Sciences or the School of Government and Business Administration, and are either required or recommended in specific undergraduate programs in the School of Medicine and Health Sciences. Students are reminded, however, that not all these courses are acceptable even as electives in certain Allied Health Programs. Students should consult with the program advisor in choosing electives for the particular program in which they are enrolled.

Courses acceptable to meet human competence requirements:

Humanities

Art History
Classics
East Asian Languages and Literatures
English
Germanic Languages and Literatures
Music
Philosophy
Religion
Romance Languages and Literatures
Slavic Languages and Literatures
Speech and Drama

Social Studies

American Civilization
Anthropology
Economics
Geography and Regional Science
History
Journalism
Political Science
Psychology
Sociology

ACCOUNTING

1 **Introductory Accounting** (3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communications of significant economic and financial data. Laboratory fee, $25 per semester.

AMERICAN CIVILIZATION

71-72 **Introduction to American Civilization** (3–3)

Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance.

ANTHROPOLOGY

1-2 **Introductory Anthropology** (3–3)

Anth 1: survey of man's origin, physical evolution, and culture history. Anth 2: survey of the world's cultures, illustrating the principles of cultural behavior.

ART HISTORY

31-32 **Survey of Western Art** (3–3)

A foundation for further study in the history of art. Art 31: prehistoric to Gothic art. Art 32: proto-Renaissance to contemporary art.

71–72 **Introduction to the Arts in America** (3–3)
Art 71: Colonial beginnings to the Republican Age. Art 72: 19th cen
to the present.

BIOLOGICAL SCIENCES

11–12 **Introductory Biology for Science Majors** (4–4)
Lecture (3 hours), laboratory (3 hours). Biological principles and p
lems designed to furnish a base for advanced studies in biology and
lated sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $24
semester.

104 **Comparative Vertebrate Anatomy** (4)
Lecture (2 hours), laboratory (4 hours). Evolution and compara
morphology of chordata, stressing recent forms. Material fee, $24.

111 **Introductory Microbiology** (4)
Lecture (2 hours), laboratory (4 hours). Survey of the major groups
microorganisms with emphasis on structure, physiology, ecology, ph
genetic relationships, and economic importance. Prerequisite: one
of chemistry. Material fee, $24.

127 **Genetics** (3)
Introductory course. Basic aspects of transmission of genetic traits
particular reference to the chemical basis of heredity and gene action.

128 **Genetics Laboratory** (1)
Study of genetic principles using Drosophila, *E. coli*, and lambda ph
Prerequisite or concurrent registration: BiSc 127. Material fee, $24

148 **Histology** (4)
Lecture (2 hours), laboratory (4 hours). Introduction to microscop
anatomy of normal tissues and organs with emphasis on the interr
tionship of structure and function. Material fee, $24.

163 **Human Physiology** (3)
Introduction to the function of organ systems of the human body.

164 **Human Physiology Laboratory** (1)
Study of basic physiology laboratory techniques; emphasis on the exp
mental study of homeostatic mechanisms in humans. Prerequisite
concurrent registration: BiSc 163. Material fee, $28.

165 **Vertebrate Physiology** (4)
Lecture (3 hours), laboratory (3 hours). Detailed study of selected s
systems, stressing chemical and physical bases. Prerequisite: BiSc
and 164, or equivalent. Prerequisite or concurrent registration: C
151–52 or 50. Material fee, $28.

BUSINESS ADMINISTRATION

102 **Fundamentals of Management** (3)
Planning, organizing, directing, coordinating, and controlling activitie
the administrative unit; evolution of management thinking.

105 **Personnel Management** (3)

The labor force and labor markets. Industrial personnel and manpower programs, organization and policy in personnel activities.

CHEMISTRY

11–12 **General Chemistry** (4–4)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 per semester.

22 **Introductory Quantitative Analysis** (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of quantitative analysis by classical methods; introduction to instrumental analysis. Prerequisite: Chem 12. Laboratory fee, $28.

50 **Introduction to Organic Chemistry** (4)

Lecture (3 hours), laboratory (3 hours). A terminal course for students in related disciplines. Prerequisite: Chem 12 or 16. Laboratory fee, $28.

ECONOMICS

1–2 **Principles of Economics** (3–3)

Lecture (2 hours), discussion (1 hour). Survey of the major economic principles, institutions, and problems in contemporary life. Econ 1: macroeconomics; Econ 2: microeconomics.

ENGLISH

9 **English Composition: Language as Communication** (3)

Intensive grammar and composition course for students inadequately prepared for Engl 10. Detailed instruction, drill, and exercises in basic structure and writing paragraphs; also includes content covered in Engl 10. In addition a noncredit reading course, given by the Reading Center, is required for students whose test scores show a reading deficiency. Engl 9 meets five hours per week and carries three semester hours of credit; the reading course meets an additional three hours per week for a maximum of 10 weeks. Special fee, $25.

10 **English Composition: Language as Communication** (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

11 **English Composition: Language and the Arts and Sciences** (3)

Study and practice of expository and argumentative techniques; emphasis on the rhetorical complexities of the sentence and of diction, and on logical thought, by analysis of selected readings on the nature of language and of the arts and sciences. Prerequisite: Engl 9 or 10. Students who receive credit for Engl 11 cannot receive credit for Engl 12.

12 English Composition: Language in Literature (3)

Study and practice of expository and argumentative techniques thr critical writing; emphasis on the rhetorical complexities of stylistics i sentence and in diction, and on logical thought, by the study of lit genres and of the use of language in literature. Prerequisite: Engl 10. Students who receive credit for Engl 12 cannot receive credit Engl 11.

20 The Writing of Reports (3)

Offered only off campus. Theory and practice in the writing of tech reports. Prerequisite: Engl 9 or 10 and 11.

43–44 Classical Humanities (3–3)

Offered only off campus. Interdisciplinary study of the origins of W ern thought. Reading and intensive class discussions of selections the Bible and from five works each semester from the following auth Homer, Hesiod, Aristophanes, Plato, Aristotle, Aeschylus, Euripi Sophocles, Herodotus, Thucydides, Lucretius, Marcus Aurelius, Epict Polybius, St. Augustine. Background lectures on the major intellec artistic, economic, and social movements.

45–46 Humanities in the Modern World (3–3)

Offered only off campus. Interdisciplinary study of modern We thought from the Renaissance to the 20th century. Reading and sive class discussion of five works each semester from the follo authors: Machiavelli, Pope, Voltaire, Rousseau, Goethe, Tolstoy, J.S Zola, Nietzsche, Kierkegaard, Freud, Kafka, Koestler, T.S. Eliot, ground lectures on the major intellectual, artistic, economic, and movements.

51–52 Introduction to English Literature (3–3)

Representative works by major authors studied in their historical con discussion of recurrent themes, and introduction to various types forms of imaginative literature.

71–72 Introduction to American Literature (3–3)

Historical survey. Engl 71: from beginnings to the Civil War. Engl from the Civil War to present.

101 Expository Writing (3)

Types of expository writing; weekly exercises based on students' pa particular attention may be given to problems in the writing of pr ate theses. Prerequisite: Engl 9 or 10; 11 or 12.

191–92 Introduction to European Literature (3–3)

Selected major works in various genres, read in translation and in tirety. Engl 191: *Iliad* and *Aeneid;* dramas from ancient to modern W Engl 192: Plato, Ovid, and Dante; medieval saga and romance; prose tion from Cervantes to Mann.

EXPERIMENTAL HUMANITIES

***26 Environmental Issues** (3)

An interdisciplinary analysis of selected aspects of the population tion, pollution and human health, urban environmental problems, of economic growth and development, technology and public policy

* Offered jointly by the Division of Experimental Programs and the Departments of Bio Sciences and Geography and Regional Science.

GEOGRAPHY AND REGIONAL SCIENCE

51 **Introduction to Geography** (3)

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 **Introduction to Economic Geography** (3)

Examination of the basic principles which determine the location of economic activities.

HEALTH CARE ADMINISTRATION

*142 **Financial Management in Health Care Institutions** (3)

Consideration of the nature, analysis, and interpretation of accounting data. Cost accounting, budgeting and internal control techniques, emphasis on their use in the management planning and control process.

153 **Survey of Health Care Organization** (3)

Introduction to the organization and delivery of health care services in the U.S. Emphasis on the structural features of and the resources available to the health care system.

154 **Introduction to Hospital Management and Procedures** (3)

Introduction to the structure and management of contemporary American hospitals; emphasis on the organization of hospital departments and on the functions of the department manager.

*170 **Quantitative Methods in Health Care Administration** (3)

Application of quantitative methods to the health services industry. Fundamental statistical techniques enabling the student to read, comprehend, critically appraise, and intelligently utilize the growing volume of quantitative research appearing in the health services literature. Familiarization with quantitative procedures applied to analyzing management problems in the operational environment. Emphasis on establishing a fundamental understanding of statistical ideas rather than upon manipulating predeveloped formulas.

HISTORY

39–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present.

71–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from the beginning to 1876. Hist 72: from 1876 to present.

* General. Offered only off campus for students enrolled in the Bachelor of Science in Health Care Administration degree program at the Naval School of Hospital Administration. Offered on campus when justified by sufficient enrollment.

MATHEMATICS

3 College Algebra (3)
Equivalent to the standard two years of high school algebra with seve additional topics. Prerequisite: one year each of high school algebra a high school geometry.

6 Plane Trigonometry (3)
Prerequisite: two years of high school algebra and one year of high sch geometry, or Math 3 (or concurrent registration therefor).

9 General Mathematics I (3)
For students electing Math 9 and 10 as a terminal sequence. Logic, s Euclidean and non-Euclidean geometries. Algebra; calculus. Prerequisi two years of high school mathematics.

10 General Mathematics II (3)
Probability and statistics. The computer. Modern mathematical syste applications to the social sciences and humanities. Prerequisite: Math

30 Precalculus (3)
Set theory, inequalities, basic analytic geometry, functions and relatio Polynomial, trigonometric, logarithmic, and exponential functions. P requisite: Math 3 and 6; or one and one-half years of high school al bra, one year of high school geometry, and one-half year of high sch trigonometry; or equivalent. Prior to registration, new students must ta a placement examination in algebra and trigonometry.

31 Calculus of One Variable (3)
Differentiation and integration of algebraic and elementary transcende functions, with simple applications. Prerequisite: Math 30 or equivalent

51 Mathematics for the Social and Management Sciences I (3)
Notion of function, graph of function; sequences; differential calculus functions of one variable; exponential and logarithmic functions. N students must take a placement examination in algebra prior to registrati

52 Mathematics for the Social and Management Sciences II (3)
Integral calculus of functions of one variable; functions of several va ables; partial derivatives, maxima and minima, Lagrange multipliers; s tems of linear equations and inequalities; matrix algebra, determina rudiments of linear programming. Prerequisite: Math 51 or 53.

MUSIC

3 Introduction to Musical Understanding (3)
Introductory history of musical styles, related to listening; elements a materials of music.

4 Survey of Music Literature (3)
Introductory study of musical forms, structures, and textures; aural an sis of selected literature.

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* Math 30 may be waived as a prerequisite by examination on scheduled dates.

PHILOSOPHY

50 Introduction to Philosophy (3)

Readings from major philosophers and study of philosophic positions from Plato to Sartre.

POLITICAL SCIENCE

1 Introduction to Comparative and International Politics (3)

Comparative and international political systems; emphasis on structures and processes of major foreign governments and the force of basic ideologies.

2 Introduction to American Politics and Government (3)

Structure, powers, and processes of the American political system.

PSYCHOLOGY

1 General Psychology (3)

Fundamental principles underlying human behavior.

8 Psychology of Motivation and Personality (3)

Introduction to the psychology of personality. Principles of motivation, personality development, social and cultural factors, and assessment and description of personality emphasized.

22 Introduction to Educational Psychology (3)

The contributions of psychology to education; emphasis on learning.

144 Personnel and Industrial Psychology (3)

Psychological concepts and methods applied to problems of personnel management, human engineering, employee motivation and productivity.

151 Social Psychology (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism, and war.

RELIGION

9 The Hebrew Scriptures (3)

Historical and literary study of the Hebrew Scriptures (Old Testament) with consideration of development of religious ideas, institutions, and outstanding personalities.

10 The New Testament (3)

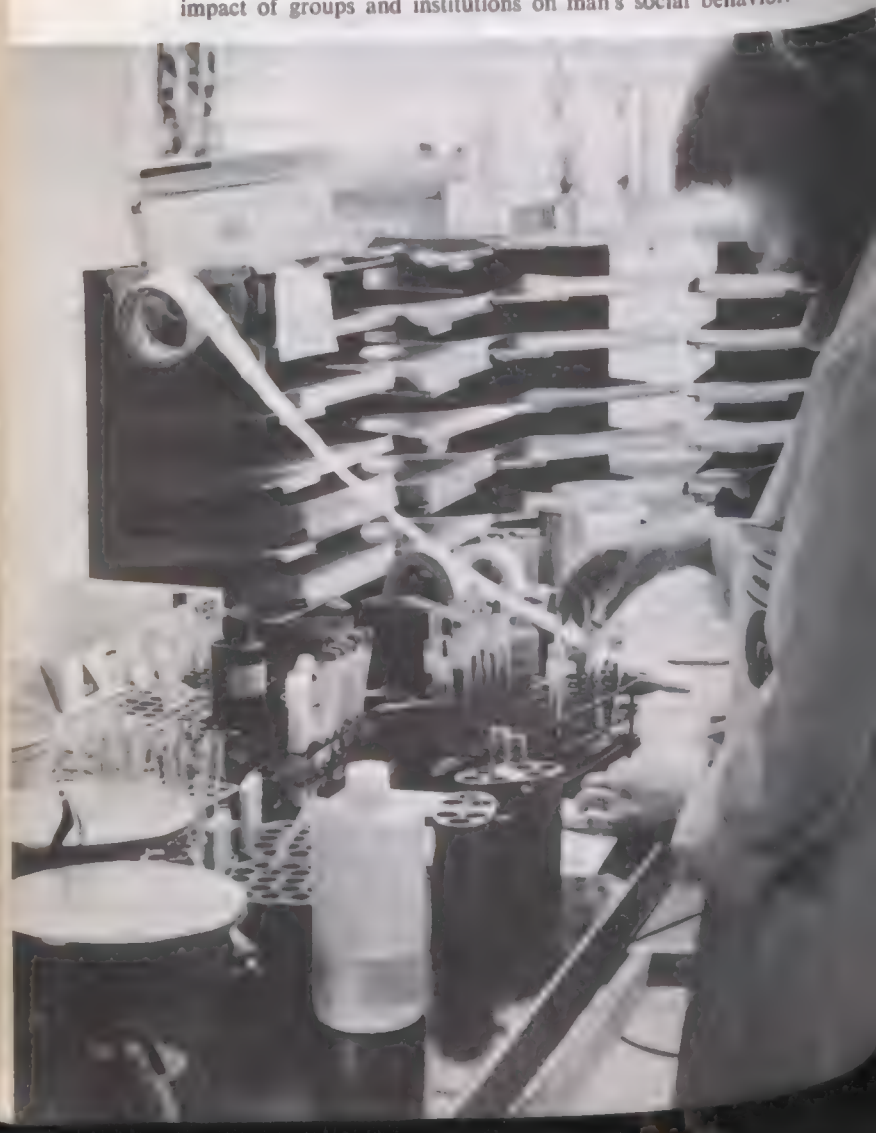
Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

59 **Religions of the East** (3)
Origins, evolution, and contemporary status in historical context primitive religions, Hinduism, Buddhism, Taoism, Confucianism, Shinto.

60 **Religions of the West and Near East** (3)
History of religion in the ancient world (e.g., Greece) and of Judai Christianity, and Islam, including modern developments.

SOCIOLOGY

1 **Introductory Sociology** (3)
General principles of sociology; development of culture and personali impact of groups and institutions on man's social behavior.



2 **Major Social Issues** (1, 2, or 3)

Critical examination of three selected social issues in a modular format. Each issue will be offered in a module of about 4½ weeks. Students may register for one, two, or three modules, for a corresponding number of credits. Issues change each semester.

124 **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illnesss; medical occupations and professions, medical organizations, problems of delivery of health care services.

129 **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice.

SPEECH AND DRAMA

1 **Communicative Speaking and Listening** (3)

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group and public situations. Recording fee, $4.

111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prequisite: SpDr 1 or permission of instructor.

STATISTICS

*51 **Introduction to Business and Economic Statistics** (3)

Lecture (3 hours), laboratory (1 hour). Frequency distribution, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, time series, index numbers. Laboratory fee, $18.

*91 **Principles of Statistical Methods** (3)

Probability, frequency distributions and their characteristics, descriptive measures, estimation, tests of hypotheses, regression and correlation. Laboratory fee, $18.

* Stat 51; 59, *Introduction to Statistics in Social Sciences;* and 91 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

COURSES OF INSTRUCTION

The School of Medicine and Health Sciences serves other divisions of the University by making available to nonmedical students certain undergraduate and graduate courses in the following departments: anatomy, biochemistry, microbiology, pathology, pharmacology, and physiology. The courses listed are subject to change. The University reserves the right to withdraw any course announced.

STAFF OF INSTRUCTION

The Staff of Instruction listed under each department and at the back of this *Bulletin* is current as of July, 1978.

EXPLANATION OF COURSE NUMBERS AND SYMBOLS

A number in parentheses after the name of the course indicates number of semester hours of credit which may be earned. Five semester hours of credit per four-week elective period are granted for all fourth-year courses in the M.D. program.

Courses numbered from 1 to 100 are for first- and second-year undergraduate allied health students. Courses numbered from 101 to 200 are for third- and fourth-year undergraduate allied health students. Courses in the basic science departments numbered from 201 to 400 are for candidates for the M.D. degree and for students in the Graduate School of Arts and Sciences. All other courses numbered from 201 to 400 are primarily for candidates for the M.D. degree.

KEY TO ABBREVIATIONS

The following abbreviations are used by the University for course designations.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BlSc	Biological Sciences
BAd	Business Administration
Cart	Cartography

Chem	Chemistry
Chin	Chinese
CE	Civil Engineering
CH&D	Child Health and Development
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EngS	Engineering Science
Engl	English
EFL	English as a Foreign Language
EnHe	Environmental Health
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Ger	Germanic Languages and Literatures
Gern	Gerontology
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
IAf	International Affairs
Ital	Italian
Japn	Japanese
Jour	Journalism
Law	Law
LEnf	Law Enforcement
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineering
M&PA	Medical and Public Affa
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynecolo
Ocea	Oceanography
OR	Operations Research
Opht	Ophthalmology
Oral	Oral Biology
Orth	Orthopaedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavior Sciences
Psyc	Psychology
PAd	Public Administration
Rad	Radiology
Rel	Religion
SLP	Service-Learning Progra
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SpDr	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Operations
U&RP	Urban and Regional Plan
Urol	Urology
WStu	Women's Studies

Anatomy

Chairman: R.S. Snell

Professors F.D. Allan, T.N. Johnson, R.S. Snell, E.N. Albert
Professorial Lecturers J.L. Angel, T.S. Reese, M.F. Brightman
Associate Professors M.J. Koering, K.E. Johnson
Associate Professorial Lecturer J.A. Di Paolo

Assistant Professors J.M. Kerns, B.E. Gilson, D. Kadioglu, F.J. Slaby, R.J. Walsh

Assistant Professorial Lecturer M.F.K. Ericksen

115 **Anatomy for Anesthetists** (3) Staff
For nursing anesthesia students. Anatomical facts and concepts essential for safe administration of anesthetics; emphasis on anatomy of head and neck.

*201 **Anatomy** (12) Staff
Integrated anatomical disciplines: regional gross dissection, histology, embryology. (Fall)

202 **Gross Anatomy** (6) Snell and Staff
For graduate students. Regional dissections of adult cadaver supplemented with lectures and x-rays. Laboratory fee, $30. (Fall)

203 **Human Embryology** (1) Snell and Allan
For graduate students. Origin and development of human body; emphasis on value of embryology in interpreting anatomical anomalies. (Fall)

204 **Neuroanatomy** (2) T. Johnson, Kerns
For graduate students. Gross and microscopic anatomy of central nervous system and special senses. Students who have received credit for Anat 204 may not register for Anat 212. Laboratory fee, $13. (Fall)

205 **Human Microscopic Anatomy** (3) Albert and Staff
For graduate students. Microscopic structure of cells, tissues, and organs of the human body. Laboratory fee, $20. (Fall)

206 **Scanning Electron Microscopy** (2) Koering
Preparative techniques for various biological tissues, operation of scanning electron microscope, and interpretation of micrographs. Laboratory fee, $30. Enrollment limited. Prerequisite or concurrent registration: Anat 260. (Fall)

208 **Comparative Vertebrate Neurology** (1) T. Johnson
For graduate students. Survey of the evolution of the vertebrate brain. Prerequisite: Anat 204. Laboratory fee, $10. (Spring)

209 **The Use of Audiovisual Techniques in Anatomy** (2) Allan
For graduate students. Preparation of a significant audiovisual program of some aspect of human anatomy. Laboratory fee, $20. (Spring)

210 **The Use of Computers in Anatomy** (2) Snell
For graduate students. Applying computer techniques to the problems of learning anatomy. Limited enrollment. Laboratory fee, $20. (Spring)

212 **Neurobiology** (3) Staff
For graduate students. Same as Idis 212 and Phyl 212. Integrated survey of the structure and function of the human nervous system. Lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

* Required for medical students.

221–22 **Seminar** (1–1)
For graduate students. Research reports and discussions of special to by guest lecturers, staff, and graduate students. Medical students enc aged to attend. (Academic year)

249 **Introduction to Anatomical Research** (1)
For graduate students. Major research techniques as applied to biolo materials in the various anatomical disciplines. (Fall)

252 **Physical Anthropology** (1)
Variations in humans and factors affecting them, human evolution racial differences, anatomy and culture of ancient man. (Spring)

254 **Fetal Anatomy** (2)
Dissection of the midgestational human fetus. Comparison of fetal adult structures. 20 students. Laboratory fee for nonmedical stude $10. (Spring)

256 **Teratology** (1)
(Formerly Human Genetics)
Etiology and mechanisms of common congenital malformations. Lim enrollment.

260 **Electron Microscopy in Cellular Biology—Lecture** (1)
Introduction to the morphology of the cell and its relationship to elec microscopic techniques. (Spring)

261 **Transmission Electron Microscopy** (3)
Introduction to the routine processing of specimens; preparation interpretation of micrographs. Limited enrollment. Admission by per sion of instructor. Prerequisite or concurrent registration: Anat 260. L oratory fee, $25. (Fall and spring)

262 **Gross Anatomy of Upper and Lower Extremities** (2)
Detailed dissection, supplemented by x-ray anatomy; discussions, assig reading. Limited enrollment. Laboratory fee for nonmedical stude $10. (Spring)

263 **Applied Anatomy of the Autonomic System** (5)
Comprehensive study of the structure and function of the autono nervous system. 4-week elective periods.

264 **Gross Anatomy of Head and Neck** (2)
Detailed dissection, supplemented by x-ray anatomy; discussions, assig reading. Limited enrollment. Laboratory fee for nonmedical stude $10. (Spring)

265 **Clinical Cell Biology and Electron Microscopy** (5)
Investigation into definitive clinical problems with electron microsc and other related cytological techniques. 4-week elective periods.

266 **Gross Anatomy of Thorax and Abdomen** (2)
Detailed dissection, supplemented by x-ray anatomy; discussions, assig reading. Limited enrollment. Laboratory fee for nonmedical stude $10. (Spring)

268 **Gross Anatomy of Pelvis, Perineum, and Lower Extremity** (2) — Snell and Staff

Detailed dissection, supplemented by x-ray anatomy; discussions, assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

270 **Dissection of the Human Brain** (1) — T. Johnson

Dissection of major pathways and nuclei of the brain with consideration of ventricular system; conferences and assigned reading. Limited enrollment. Laboratory fee for nonmedical students, $10. (Spring)

272 **Autonomic Nervous System** (1) — Allan

Development, microscopic and gross anatomy, function of central and peripheral components of autonomic nervous system. (Spring)

276 **Advanced Studies in Anatomy** (1) — Staff

Lectures and conferences on selected anatomical subspecialties—endocrinology, teratology, growth, etc. May be repeated for credit. (Spring)

279 **Applied Regional Anatomy** (5) — Snell

Regional dissection, guided readings, weekly discussions. 4-week elective periods.

281 **Applied Anatomy of the Newborn** (5) — Allan, Snell

The full-term fetus or neonatal infant examined by dissection or by study of pre-dissected specimens. 4-week elective periods.

282 **Advanced Neuroanatomy** (5) — T. Johnson

Dissection of the human brain, study of slides of the central nervous system, and an introduction to neurological research. 4-week elective periods.

284 **Applied Surface Anatomy and Radiology** (5) — Snell

Detailed study of anatomical structures which are accessible to examination in the living subject; normal radiology of the body. 4-week elective periods.

285 **Application of Audiovisual Techniques to Anatomy** (2) — Allan

Students identify, develop, and produce an audiovisual program on some aspect of human anatomy. 4-week elective periods.

288 **Surface Anatomy and Radiology** (1) — Snell

Lectures and demonstrations on areas of clinical importance.

289 **Application of Computer Techniques to Anatomy** (5) — Snell

Anatomical program designed to demonstrate the application of computer techniques to problems of learning anatomy. 4-week elective periods.

291 **Special Projects in Anatomy** (5) — Snell

Independent study on an aspect of gross anatomy. 4-week elective periods.

292 **Advanced Reproductive Endocrinology** (5) — Koering

Study of structure and function of male and female reproductive organs; emphasis on correlating their activities with those of other endocrine glands. 4-week elective periods.

293 **Atherosclerosis** (5)
Scanning and transmission electron microscopy of atherosclerotic vess
before and after drug treatment.

295 **Research** (arr.)
Content differs each time course is offered; may be repeated once fo
credit. Fee to be arranged. (Fall and spring)

299 **Biochemical and Morphological Techniques in Cell Biology** (3)
Techniques currently used in the isolation of subcellular fractions a
their biochemical and morphological characterization.

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general e
amination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for cred
(Fall and spring)

Anesthesiology

Chairman: C.S. Coakley

Professors C.S. Coakley, S. Alpert, B.S. Epstein, P. Mazel, R.J. Van Houten, J
Weintraub, W.L. Marsh

Associate Professors M. Kennedy, G.A. Morales, B.S. Dunbar, J.B. Craft, J
A.H. Alstatt, J.E. Zimmerman, B.E. Filner, M. Shahvari

Adjunct Associate Professors C.W. Jones, R.H. Norton

Associate Clinical Professors S.N. Albert, M.W. Lichtmann

Assistant Professors M.J. Shaffer, M.T. Karna, D.S. Lee, V.A. Argumedo, S
Deshmukh, M.H. Thein, J.A. Tam, A. Fields, P. Holbrook, S.J. Aidinis, J
Jones, P.R. Lichtenthal, L. Mantel, W.A. McGill II, B. Tsai, M.D. Abram
witz, N.R. Bishop, S.S. Edelstein, L. Greiss, W.A. Knaus

Adjunct Assistant Professors R.L. Barth, R.F. Berish, C.C. Yu

Assistant Clinical Professors W.E. Bageant, C. Albert, P. Lowenthal, H.W
Manitsas, R.D. McKay, H.F. Nicodemus

Instructors M.C. Modaressi, A.P. Murray, M.M. Pollack

Courses numbered 190 through 198 are for nursing anesthesia students.

190 **Seminar: Anesthesiology** (4)
Small discussion groups on morbidity and mortality from actual
reported cases. Topics related to complications of anesthesia.

191 **Respiratory Care** (3) **Staff**

Advanced techniques for the care of patients requiring total prolonged respiratory support.

192 **Orientation for Anesthesia** (0) **Staff**

(Formerly three credits)

Lecture, group discussion, and audiovisual presentation. History of anesthesia, legal aspects, ethics, psychology, professional adjustments, department management, and organization.

193 **Methods and Procedures in Anesthesia** (4) **Staff**

At affiliated hospitals. Lecture, group discussion, and audiovisual presentation. Anesthesia techniques, positions in anesthesia, types of anesthetic required to meet the needs of different surgical specialties, and related topics.

194 **Principles of Clinical Anesthesia** (26) **Staff**

Twelve-month course at affiliated hospitals. Supervised clinical training and experience. The student is assigned patients, organizes and administers anesthesia, and follows the patients through their total hospitalization. Designed to satisfy the American Association of Nurse Anesthetists requirements.

195 **Electronics for Medical Personnel** (2) **Staff**

Introduction to fundamental principles used in electronic instrumentation for monitoring patient status in operating room and intensive care unit. Power, biomedical voltages and transducers, blood pressure and heart rate monitors, displays, telemetry, special purpose instruments, safety hazards analysis techniques for technical equipment procurement. (Fall)

198 **Pathological Physiology and Anesthesia** (3) **Staff**

Review of patho-physiology of major organ systems in relation to anesthesia. Clinical implications of various disease states, their interactions with anesthetics, and effects on anesthetic management.

210 **Anesthesiology Research Laboratory** (2)

Cardiovascular physiologic changes and measurements resulting from drugs, drug interactions, anesthetic techniques, etc. Placental transfer and fetal and maternal physiologic changes from toxic local anesthetic reactions.

*302 **Clinical Clerkship** (2) **Staff**

Clinical preoperative evaluation, surgical and obstetrical anesthesia, infant and adult resuscitation, inhalation therapy, management of patients in coma, shock, and other problems which may be encountered in medical practice. 1 week—Univ. Hosp., 1 week—Walter Reed Gen. Hosp. or Wash. Hosp. Center. (2-week periods throughout academic year)

380 **Anesthesiology** (5) **Weintraub**

Clinical experience in preoperative evaluation; surgical, obstetrical, neurosurgical anesthesia; infant and adult resuscitation; inhalation therapy;

*Required for medical students.

monitoring and blood gas determinations. 4-week elective periods. Univ. Hosp.

384 **Intensive Care Unit** (5) Shahvari, Zimmerma

Evaluation and management of respiratory failure, rationale and use automatic ventilators, chronic airway management, cardiovascular suppo and intensive care. 4-week elective periods. Univ. Hosp.

386 **Intensive Care Unit** (5) Staf

Evaluation and management of respiratory failure, rationale and use automatic ventilators, airway management, cardiovascular support tec niques, and intensive care medicine. 4-week elective periods. Nat'l Na Med. Center.

390 **Extramural Anesthesiology Elective** (arr.)

The department arranges for students to spend elective periods at othe institutions. Interested students should contact Dr. Herbert Weintraub.

Biochemistry

Chairman: A.L. Goldstein

Professors C.R. Treadwell *(Emeritus)*, B.W. Smith, G.V. Vahouny, J.M. Bailey, H.H. Hess, A.L. Goldstein

Professorial Lecturers W.W. Burr, Jr. *(Isotopes)*, E. Steers, Jr., G. Guroff, A.D. Schechter, E.P. Anderson, C.R. Merril, J.C. Smith, Jr., M.L. Minthorn, Jr., P.H. Fishman

Associate Professors G.A. Walker, G.B. Thurman *(Research)*

Assistant Professors L.L. Gallo, M.A. Vander Maten *(Research)*, R.W. Bryant, Jr. *(Research)*, C.E. Low *(Research)*, T.L.K. Low *(Research)*, J.Y. Vanderhoek *(Research)*

Assistant Professorial Lecturer C.L. Trichilo Trichi

101 **Chemistry for Allied Health Sciences** (2) Walk

111 **Biochemistry for Allied Health Sciences** (3) Staf

*201 **Medical Biochemistry** (8)

Lectures and laboratory; emphasis on basic principles and their relation to medicine. (Fall)

221–22 **General Biochemistry** (3–4) Gallo, Vahouny, and Staf

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Generally, graduate students must register concurrently for Bioc 223 and for Bioc 224. However, graduate students taking Bioc 225-26, Fou

* Required for medical students.

281-82, Micr 241-42 or Phys 223-24 may register for Bioc 221-22 without the laboratory. With specific recommendations by the undergraduate advisor and the department, undergraduate students may register for Bioc 221-22 without laboratory. Prerequisite: Chem 152, 154. (Academic year)

223–24 **Biochemistry Laboratory** (1–1) **Gallo and Staff**

Laboratory complement of Bioc 221-22. Concurrent registration in Bioc 221-22 required. Materials fee, $20 per semester. (Academic year)

225–26 **Biomedical Instrumentation** (4–4) **Smith and Staff**

Same as Micr 241-42 and Phyl 223-24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification, and quantification of materials of interest to biomedical and forensic scientists. Laboratory fee. $50. (Academic year)

227 **Biochemistry Seminar** (1) **Bailey**

Current literature in biochemistry. Intended for graduate students, but open to a limited number of specially qualified medical students. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

229 **Biochemistry of Enzymes** (1) **E. Anderson**

Two separate courses are offered in alternate years, each covering both general and advanced material; students may register for these in either order and cover the entire content in two years. The full content includes practical handling of enzymes, kinetics, reaction mechanisms, active site, isozymes, regulation, and other special topics. Prerequisite: Bioc 221. (Fall)

232 **Protein Chemistry I** (1) **Steers, Schechter**

Prerequisite: Bioc 201 or 221. (Fall)

233 **Protein Chemistry II** (1) **Steers, Schechter**

Continuation of Bioc 232. Methods for the study of protein confirmation; determination of active sites of enzymes; mechanisms of reactions at the active site. (Spring)

241 **Isotopes** (3) **Burr**

Theoretical characterization of isotopes and their applications in biology and medicine. Attention given to counting, health physics and radiation safety, autoradiography, chromatography. Laboratory fee for nonmedical students, $16. (Spring)

251 **Carbohydrate Metabolism** (1)

Prerequisite: Bioc 201 or 222. (Spring, even years)

252 **Biochemistry of the Brain** (1) **Staff**

For medical students; open to limited number of graduate students. Recent biochemical developments in structure, functions, and metabolic processes unique to the brain. (Spring)

254 **Human Nutrition** (1) **Staff**

For medical students; open to limited number of graduate students. Application of nutritional principles in humans. (Spring)

256 Biochemistry of Organ Function (1) N. Kram

For medical students; open to limited number of graduate students. Em phasis on biochemical processes unique to particular organ systems; app cation of these processes to evaluation of function. (Spring)

260 Biochemistry of the Steroids (1) Dod

For medical students; open to limited number of graduate students. Bio chemistry of the steroids, pathways of biosynthesis and metabolism, reg latory mechanisms, physiologic effects, clinical measurement of endogen steroids, clinical manifestations of steroid imbalance, steroid changes pregnancy, and steroid therapy. (Spring)

262 Biochemistry of the Lipids (1) Vahou

Discussion of topics of current interest, including digestion, energy pr duction, biosynthesis, function in specialized tissues and subcellular pa ticles. Content differs each time course is offered; may be repeated f credit. (Spring)

264 Membrane Associated Complex Lipids (1) Fishm

Topics will cover the catabolism and biosynthesis of complex sphingo lipids; inherited metabolic diseases associated with abnormal sphingolip metabolism; altered glycosphingolipid biosynthesis associated with m lignant transformation; potential roles of gangliosides as membrane re ceptors for toxins and hormones; aspects of membrane structure and bi chemistry.

266 Biochemical Genetics and Inherited Metabolic Diseases (1) Mey

For medical students; open to limited number of graduate students. Bio chemical aspects of genetics and contributions of molecular biology t understanding of human mutations and hereditary diseases. (Spring

***268 Muscle Contraction: Physiological and Biochemical Aspects** (2) Walker, Fra

Anatomical, biochemical, pharmacological, and physiological aspects muscle contraction. Prerequisite: An introductory course in biochemis and physiology, or permission of the department.

279 Research in Renal Function, Mutarotase, and Sugar Transport (10) Balk

Clinical significance of plasma mutarotase levels in kidney disease. 8-wee elective periods.

280 Research in Experimental Atherosclerosis (10) Balk

Study of factors influencing the development and course of atherosclero in rabbits. 8-week elective periods.

281 Research in Biochemistry of Carbohydrates and Enzymes (10) B. Smit

Research in a problem already under investigation in the department a project in related fields suggested by the student. 8-week elective perio

* An interdisciplinary course offered by the Physiology and Biochemistry Departments.

282 **Research in Biochemistry of Lipid Metabolism and Transport** (10) — Vahouny

Biochemical investigation of a clinical problem involving lipids of special interest to the student, or participation in existing research program in the department. 8-week elective periods.

283 **Research in Metabolic Regulation within the Heart** (10) — Vahouny

Studies on metabolic regulation and effects of drugs. 8-week elective periods.

284 **Research in Cholesterol Absorption and Metabolism** (10) — Gallo

Participation in departmental research program involving the mechanism and prevention of cholesterol absorption. 8-week elective periods.

286 **Research in Biochemistry and Molecular Biology of RNA Tumor Viruses or DNA Polymerases of Mammalian Cells** (10) — R.C. Gallo*

Investigative work at the National Cancer Institute, NIH. 8-week elective periods or equivalent.

287 **Research on the Function of B_{12} Coenzymes in Cell Replication** (10) — Walker

Research in a problem under investigation in the department. 8-week elective periods.

288 **LDH Viruses in Immunosuppression** (10) — Bailey

Changes in plasma enzyme clearance and cellular immune mechanisms in LDH virus infection. 8-week elective periods.

290 **Extramural Biochemistry Elective** (arr.) — Staff

The department arranges for medical students to spend elective periods at other institutions. Interested students should contact the chairman of the department.

295 **Research in Biochemistry** (arr.) — Staff

For first- and second-year medical students and graduate students. Participation in a project under investigation in the department or one in a related field suggested by the student and approved by the staff. Content differs each time course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) — Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) — Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) — Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

*Dr. Gallo is Senior Investigator at the National Cancer Institute.

Child Health and Development

Chairman: R.H. Parrott

Associate Chairmen: F.C. Green *(Child Health Advocacy)*, D.W. Del
(House Staff and Medical Care), J.L. Todaro *(Student Affairs)*, J.G. B
dolph *(Surgical Division)*

Directors of Divisions: C.A. Rigg *(Adolescent Medicine)*, R.M. Sly *(Aller*
F.C. Green *(Ambulatory Medicine)*, L.P. Scott *(Cardiology)*, M.L. E
(Dermatology), W. Hung *(Endocrinology)*, D.W. Delaney *(General Me*
cine), S. Leikin *(Hematology)*, R. Chandra *(Anatomical Pathology)*,
Hicks *(Clinical Laboratories)*, G.B. Avery *(Neonatology)*, S.A. Shelburne
(Neurology), G.D. Eng *(Physical Medicine)*, R.J. Fink *(Pulmonary Medic*
J. Egan *(Psychiatry)*, W.J. McSweeney *(Radiology)*, B.S. Epstein *(*
thesiology), F. Midgley *(Cardiovascular Surgery)*, J.G. Randolph *(Ge*
Surgery), T.H. Milhorat *(Neurosurgery)*, D.S. Friendly *(Ophthalmo*
D.W. McKay *(Orthopaedics)*, B.M. Webb *(Otolaryngology)*, L.W. Thom
(Plastic Surgery), A.B. Belman *(Urology)*

Professors J.P. Adams, J.G. Randolph, R.H. Parrott, S. Doxiadis *(Visi*
S.L. Leikin, A.M. Margileth, B.S. Epstein, G. Avery, D.W. Delaney, W. H
L.P. Scott III, R.M. Chanock, D.W. McKay, W.J. McSweeney, F.C. Gre
M. Elgart, T.H. Milhorat, G.D. Eng, J.M. Wiener, G.R. Herer, S.A. S
burne, Jr., R.P. Altman, A.Z. Kapikian *(Research)*, J.D. Noshpitz, J.F
L.W. Perry, J.B. Sidbury, Jr., M. Sly, C.C. Rogers

Clinical Professors W.A. Howard, S. Berman, S. Ross, W. Stark, M.M. P
M. Feitel, L. Cytryn, J. Spurlock, S.L. Baker, Jr., A.B. Coleman, R.E.
ger, M.F. Shore, B.M. Webb, J.J. McFarland, Jr.

Professorial Lecturers M. Jenkins, J.A. Kenney, Jr., J.L. Sever

Associate Professors A.B. Barnet, M. Majd, N. Movassaghi, D.W. Bailey,
Battle, C.A. Rigg, G.P. August, C.D. Brandt *(Microbiology)*, H.W
D.S. Friendly, B.S. Dunbar, A.B. Fletcher, L.W. Thompson, M.R.D.
J.M.B. Hicks, J.W.L. Todaro, A.B. Belman, R.S. Chandra, R. Kurz,
Cohen, J.W. Oberman, M.N. Ozer *(Research)*, K.D. Anderson, J.H.
F.M. Galioto, R.E. Johnsonbaugh, F.M. Midgley

Adjunct Associate Professors J.R. Puig, H.B. Richardson

Associate Clinical Professors S.I. Wolf, B. Olshaker, B.C. Straight, J.J. Fri
I. Mahdavi, I.B. Bourne, A.J. Modlin, P.C. Brunschwyler, M. Fischer
Wohlford, B.H. Ong, H.R. Gold, J.L. Chamberlain III, K.B. Nelson,
Robinowitz, D.J. Fishman, M.D. Abramowitz, I. Brook, G.G. Cochran
Engel, S. Greenspan, K.L. Kaplan, J.L. Levine, D.H. McKnew, Jr., J.D
lowe, F.A. Pedreira, G.A. Tripp

Associate Professorial Lecturer P. Hamash

Assistant Professors M.M. Platt, J.H. Wise, B.J. Peacock, A.H. Ficker,
Shapiro, R.A. Cahill, L.W. Greenberg, M.T. Karna, S.S. Nason, B. Po
K. Ravenscroft, Jr., V.A. Argumedo, G.W. Bailey, M.H. Thein, J.A
M.C. Edwards, A. Fields, P. Holbrook, T.J. Silber, A.M. Glasgow, B.

Tet *(Research)*, W.J. Rodriguez, E.S. Ohrlich *(Research)*, B.M. McDonald, D.R. Brallier, C.B. Feinstein, J.F. Jones, S.P. Kapur, W.A. McGill II, D.W. Ochsenschlager, B. Tsai, I.S. Baron-Starke, I. Brook, G.J. Buffone, C.S. Camerini-Otero, V. Cheng, L. Greiss, A. Guarinello, M.K. Hammock, R.A. King, B. Koch, N.C. Luban, B.J. Maron, C.R. Mock, S.L. Murray, C.M. Naulty, R.B. Reff, K.N. Rosenbaum, J.R. Salcedo, J.L. Frank

Assistant Clinical Professors S. Mourat, M.S. Glatt, A.E. Marans, L.A. Cove, M.A.V. Fox, V.L. Guandolo, L. Lefkowitz, S.G. Werner, A.B. Zients, G.W. Hardman, Jr., G.A. Balfour, D.G. Albert, V.G. Ingram, G.W. Mella, T. Sullivan, E. Taylor, R. Evans III, S.B.W. Wooten, C.E.J. Kimball, J.R.S. Malkin, B.A. Shaver, M.L. Renfield, B. Landau, A.H. Stein, P.T. Peebles, M.M. Davis, R.A. Nover, M.A.J. Fox, A.E. Schweitzer, J.M. Burgin, T.M. Connor, J.A. Lowe, M. Ortega, M.S. Albert, J. Barber, E.C. Esber, J.C. Falion, M.L. Feldman, G. Joseph, H.A. Mangold, C.A. Renschler, R.L. Steerman, A.R. Ugel, S. Amiri, R.S. Bashian, L.M. Beard, C. Chisholm, R.P. Dickey, T. Frey, A. Gaisin, P.C. Latkin, M.E. Lederman, H.M. Meagher, W.L. McLean, P.J. Nachajski, J.F. O'Neill, H. Plotsky, R.H. Schwartz, A. Tantisunthorn, F. Strassburger, C.A.B. Schulman, D.N. Robins, S.H. Berk

Assistant Professorial Lecturer I.P. Weiss

Instructors R.D. Castro, H.W. Binder, M.C. Modaressi, J.L. Gaiter, A.B. Livingood, R.L. McDowell, Jr., M.M. Pollack, L.A. Vitulano

Adjunct Instructors E.A. Black, H.E.C. Millar

Clinical Instructors H.H. Diamond, D.A. Young, M. Rokni, B.S. Bruner, M.E. Bravo, G.W. Daisley, Jr., M.W. Datch, F.L. Stroud, H.L. Kaftarian, M.G. Walten, Jr., K.Z. Fowler, E.A.G. Pinder, M.D. Smokvina, G.M. Korengold, H.T. Vollero, I.M. Chatoor-Koch, R.H. Coleman, R.A. De Vine-Curio, P.R. Littleton, C.J. Weyland, P.A. Coyne, E.M. Hall, R.J. Mier, K.O. Simrel

Special Lecturers J.A. Bottiglione, C.J. Schulte III, C.M. Berlin, Jr., M.I. Mones, M. Schuelein, M.I. Michael, I. Seiler, J.H. Bayly, E.G. Moses, E.J. Feroli, J.M. English III, A.L. Knasel, J.D. Blake, R. Shearin

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*303 **Pediatric Clerkship** (10) — Todaro

Full-time, as part of resident team; ward rounds; work in outpatient department and specialty clinics under staff supervision; child psychiatry and child guidance, lectures, clinical conferences, grand rounds. Children's Hosp. (Annual, continuous 8-week rotation)

373 **Pediatric Urology** (5) — Belman

Participation in clinical approaches on an inpatient and outpatient basis. Assessment, diagnostic evaluation and the participation in surgical problems. 4-week elective periods. Children's Hosp.

374 **Pediatric Orthopaedic Surgery** (5) — McKay

4-week elective periods. Children's Hosp.

*Required for medical students.

375 **Pediatric Surgery** (5) Randol

Participation in an active, closely supervised surgical service for inf and children, including congenital defects, cardiac surgery, trauma, neoplasms. 4-week elective periods. Children's Hosp.

376 **Pediatric Neurology** (5) Shelbu

Participation in diagnostic and therapeutic studies on inpatients and patients. Rounds, conferences, seminars. 4-week elective periods. Childr Hosp.

377 **Community Health Development** (5) Hinch

Acquaintance with public health preventive and community medicine it is conducted by the Montgomery County, Md., Health Departm Opportunity to work in outlying health centers and central pediatric cialty clinics. Familiarization with school health programs and proje 4-week elective periods.

378 **Genetics** (5) Rosenba

Principles of basic human genetics with emphasis on the dysmorp child, chromosomal aberrations and genetic counselling. Opportunity work in the genetic laboratory and to learn chromosomal techniqu 4-week elective periods. Children's Hosp.

379 **Pediatric Intensive Care** (5) Holbrook, Fie

Clinical and didactic material on the pathophysiology and treatmen life-threatening illnesses, conditions, or injuries in childhood. Lim patient responsibility, extensive patient contact. Night call arranged i vidually. 4-week elective periods. Children's Hosp.

380 **Clinical Pediatrics** (5) Todd

Full-time acting internship in pediatrics as part of resident team. In-pa adolescent, infectious disease, general medicine, medical specialties, out-patient. This is an official Acting Internship in pediatrics.

381 **Pediatric Allergy** (5)

Introduction to pediatric allergy; clinics and wards. Some experience experimental techniques and preparation of extracts. 4-week elective p ods. Children's Hosp.

382 **Pediatric Radiology** (5) McSweeney

Participation in conferences and observation in the department; conv tional and newer non-conventional body imaging teachniques are stres in problem solving in pediatric medicine. 4-week elective periods. O dren's Hosp.

383 **Cystic Fibrosis** (5)

Detailed diagnosic and therapeutic procedures including pulmonary nutritional manifestations and complications in cystic fibrosis patie from the newborn to those in their third decade. Medical, surgical, p chological, and social problems of cystic fibrosis patients and their lies. 4-week elective periods. Children's Hosp. Edwa

384 **Newborn and Premature** (5)

Principles and practices of neonatology emphasizing basic physiolog processing; their relationship to normal development and to diseases the newborn period. 4-week elective periods. Univ. Hosp.

385 **Child Psychiatry** (5) Egan

Observation of and appropriate participation in diagnostic, consultative, and follow-up work with hospitalized children and psychiatric outpatients. Clinical and theoretical conferences. Orientation to community child psychiatry and child mental health as part of service delivery system. 4-week elective periods.

386 **Pediatric Hematology** (5) Leikin

Clinical and laboratory studies of infants and children with hematologic disorders; bone marrow examinations. 4-week elective periods. Children's Hosp.

387 **Clinical Pediatrics** (5) Soto

Care of newborn and children on inpatient basis; diagnostic studies, therapy; assigned reading. 4-week elective periods. Fairfax Hosp.

388 **Newborn Medicine** (5) Avery, Fletcher

Observation and participation in the care of infants. 4-week elective periods. Children's Hosp.

389 **Pediatric Cardiology** (5) Scott, Perry

Physical diagnosis of congenital and acquired heart diseases, interpretation of electrocardiograms and vectorcardiograms, cardiac catherizations. 4-week elective periods. Children's Hosp.

390 **Extramural Pediatric Elective** (arr.)

The department makes arrangements for students to spend elective periods at other institutions. Interested students should contact Dr. Jane Todaro after they have obtained the following: (1) a letter of approval from the Dean for Academic Affairs, (2) a description of the course or courses to be taken, and (3) a description of the affiliations of the other institution.

393 **Pediatric Anatomical Pathology and/or Clinical Pathology** (5) Chandra

Participation in necropsy and surgical pathology service. Clinical correlation of histopathology, laboratory studies, and clinical disease. 4-week elective periods. Children's Hosp.

394 **Pediatric Clinical Laboratory** (5) Hicks

Laboratory studies of infants and children correlated with clinical disease. In-depth review of laboratory diagnostic studies. 4-week elective periods. Children's Hosp.

395 **Endocrinology** (5) Hung, August

Evaluation of patients with metabolic and endocrine disorders. Planning diagnostic and therapeutic programs for patients in an office setting and possibly for inpatients. 4-week elective periods. Children's Hosp.

396 **The Handicapped Child and Chronic Disease** (5) Battle

Care of the handicapped child in a clinical situation and through tutorial readings. 4-week elective periods. Hosp. for Sick Children.

397 **Nephrology** (5) Salcedo

Training in clinical nephrology and hemodialysis; research opportunities in vitamin D metabolism, acid-base physiology, intravenous nutrition,

renal physiology, and calcium metabolism. 4-week elective periods. Children's Hosp.

398 **Comprehensive Care** (5) Oberman

Participating in both sick- and well-child care as administered in a comprehensive setting; experience in multidisciplinary approach; cooperative planning with other community agencies. 4-week elective periods. Comprehensive Health Care Program.

399 **Community Pediatrics** (5) Greenberg

For students primarily interested in private pediatrics practice. Care in the nursery and pediatric ward of a community hospital; exposure to private pediatrics practice in an office setting. 4-week elective periods. Holy Cross Hosp.

Clinical Engineering

Chairman: W.S. Yamamoto

Professors W.S. Yamamoto, H.V. Pipberger, J.J. Feffer
Adjunct Professors J.K. Weston, L.E. Lipkin
Professorial Lecturer B. Kemp
Associate Professors R.A. Dunn *(Research)*, F.H. Orthner
Assistant Professors A. Berson *(Research)*, H.Z. Pipberger *(Research)*, U.E. Ruttimann, W. Knaus *(Research)*, J.R. Saklad

101 **Practical Computing for New Health Practitioners** (3) Staff

For students majoring in radiologic science and administration. Designed to familiarize the student with computer systems, basic terminology, applications programming, and I/O equipment.

201 **Theory of Medicine** (1) Staff

Required course for first-year medical students, covering selected topics in biostatistics, epidemiology, utility, decision theory as applicable to the practice of medicine. Examination of the epistemology of medicine.

351 **Clinical Engineering for Medical Students** (5) Staff

Engineering technology as applied to medical problems. Students will be assigned for tutorial instruction in the principles and practices of clinical engineering. Participation in current laboratory projects, assigned reading and study. Minicomputer and microcomputer hardware applications. Elective for first-, second-, and fourth-year medical students. 4-week elective periods for seniors. Warwick Bldg.

353 **Medical Computing** (5) Staff

Aspects of computer usage, including preparation and execution of programs which involve clinical or research applications such as ECG analysis, pulmonary function calculation, medical file management, mathematical modeling, data processing, and managerial computing. In some

the staff may be able to supervise a student in an area of the student's choice: in general, however, the program will consist of classroom or laboratory instruction. Elective for first-, second-, and fourth-year medical students. 4-week elective periods for seniors. Warwick Bldg.

354 **Automated Medical Measurement Systems** (5) Staff

Under supervision, the student will work in a multiphasic screening clinic and participate in the process of new implementations and in evaluation of the system. Seminar discussion of variability in clinical findings, preventive medicine, and occupational medicine. 4-week elective periods. Warwick Bldg.

390 **Extramural Clinical Engineering Elective** (arr.) Staff

The department sponsors fourth-year students spending one or more elective periods at other institutions. Programs must have the prior approval of the department staff.

Dermatology

Chairman: M. Elgart

Professor M. Elgart
Associate Professor M.L. Turner
Associate Clinical Professors W.M. Narva, O.G. Rodman, C.S. Brown, T.P. Nigra
Assistant Professor M. Braun III
Assistant Clinical Professors P.L. Repetto, Jr., D. Mitchell, L.J. Eanet, S.H. Berk, R.A. Katz, D.N. Robins, A.R. Ugel, M. Chadab, A. Gaisin, H.S. Golomb, W.G. Klingler, D.L. Pierson
Clinical Instructor R.N. DeAngelis
Special Lecturers N. Kanof, J.A. Kenney, Jr.

380 **Dermatology Clinic** (5) Elgart

Conferences, lectures, and attendance at dermatology clinic where patients with wide variety of dermatoses are seen. Diagnosis and treatment of common skin disorders. Dermatologic surgical procedures, technique for using liquid nitrogen, culture and identification of fungi, microscopic diagnosis of common cutaneous diseases. 4-week elective periods. Univ. Ambulatory Care Ctr.

381 **Dermatology Clinic** (5) Turner

Same as Derm 380. 4-week elective periods. Group Health Asso., Inc.

382 **Dermatology Clinic** (5) Rodman

Same as Derm 380. 4-week elective periods. Walter Reed Gen. Hosp.

383 **Dermatology Clinic** (5)

Same as Derm 380. 4-week elective periods. Andrews Air Force Base Hosp.

385 **Dermatology in General Medicine** (5)
(Formerly Derm 388)
Dermatology as related to internal medicine. Mechanisms of diseases in-depth approach to dermatologic-medical problems; advanced reading 4-week elective periods. Wash. Hosp. Center.

386 **Private Office Practices** (5)
4-week elective periods.

387 **Clinical Dermatology** (5)
Introduction to clinical dermatology, by working in the out-patient dermatology clinic, observing in-patient consultations, reviewing histopathology performing skin biopsies. Close supervision by staff. Interview required 4-week elective periods. VA Hosp.

390 **Extramural Dermatology Elective** (arr.)
The department makes arrangements for students to spend 4-week elective periods at other institutions. Interested students should contact the chairman of the department.

Health Care Sciences

Chairman: J.E. Ott

Director of Division of Geriatric Medicine: V.A. Portnoi

Professors T.E. Piemme, F.C. Green, J. LaRosa, J.E. Ott

Clinical Professor A.B. Rosenbaum

Professorial Lecturer R.S. Hanft

Associate Professors R. Keimowitz, P.J. Steinglass, V.A. Portnoi, P.S. Birnbaum

Associate Clinical Professors P. Birk, S.J.N. Sugar, W.J. Washington, Jr., Marinoff

Associate Professorial Lecturer J.L. Falkson

Assistant Professors J.M. Wise, M.R. Silverman, G.W. Bailey, L. Sank, N.W. Lindenmuth, A.W. Stone, N.W. Matheson *(Research)*, L.G. Pawlson, W.G. Boren *(Research)*, S.S. Edelstein, D.S. Edge, N.Z. Einstein, A. Guarino, K.R. Katterjohn, M.A. Parker, R.K. Riegelman, J. Shapiro, C.T. Spiegel

Assistant Clinical Professors G.A. Ellsworth, S.F. Fiscina, J.C. Fallon, E. Gallieb, J.D. Hines, R.A. Berenson, M.S. Donaldson *(Research)*, J.A. Harmon, C.S. Hyatt, C.B. Mount, G.M. Shumaik, A.O. Woods

Assistant Professorial Lecturers J.K. Miller, S.E.H. Raviv, C.J. Maas

Instructors K.R. Sorem, W.A. Stein, G. Merriweather, A.M. Brescia, Shaffer

* Dr. Fischman is Chief of the Dermatology Service at the Veterans Administration Hospital.

Adjunct Instructor L.K. Davies

Clinical Instructors N.T. Connally, V.T. Miller, R.A. Berenson, E.B. Hume, V.V. Kalbian, J.C. Arnett, Jr., D. Chua, J.A. Noronha, S.R. Armstrong, H.S. Brooks, H. Jackson, G.A. Logsdon, J.W. McClelland, J.C. Noyes

Special Lecturers J.W. Argent, Jr., V.D. Buechler, W.R. Chiarulli, D.E. Deliz, Sr., J.S.M. Dimapilis, K. Goanos, J.L. Haythe, E.E. Jones, A.E. Keen, J.H. Lamkin, A.F. Marin, J.L. Preston, R.H. Price, G. Rivers, E.M. Taft, P.E. Trievel, R.E. Webber, J.N. Wray, R.W. Angel, W.G. Boettcher, Jr., L. Brodie, R.D. Cox, D.L. Duncan, A.F. LaVia, R.G. Legg, W.F. Popiela, Jr., F.P. Scazzafavo, K.L. Thomas, M.T. Threatt, A.E. Wickens

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Courses numbered from 10 through 96 are limited to military personnel in off-campus health sciences programs.

10 **Anatomy and Physiology** (3) Staff

Study of the human body: esteology, arthrology, myology, hematology, immunology; circulatory, respiratory, digestive, endocrine, excretory, nervous, and reproductive systems.

11 **Applied Anatomy and Physiology** (6) Staff

Application of anatomical and physiological principles. Control of hemorrhage, methods of resuscitation, management of shock, relief of pain; physical examination, nutrition, fluid and electrolyte balance, respiratory conditions, childbirth.

15 **Pharmacology and Toxicology** (5) Staff

Medicinal substances used in treating people: pharmaceutical mathematics, terminology, preparations, compounding, physiological action and potential toxic reactions of certain drugs, legal aspects of drug regulations.

16 **Clinical Laboratory Techniques and Procedures** (ART.) Staff

Laboratory procedures used in basic health maintenance. Use of microscope, complete blood count, acid-fast stain, urinalysis, blood sedimentation rate, RPR card test, coagulation and bleeding time, blood grouping, blood typing.

22 **Introduction to Epidemiology** (2) Staff

Study of common communicable diseases, immunologic factors, and procedures. Contact interviewing and reporting of the communicable diseases.

67 **Disaster Sanitation** (2) Staff

Survey of nuclear, biological, and chemical hazards; emphasis on detection, personnel protection, and related functions.

68 **Environmental Sanitation** (3) Staff

Study of certain environmental factors which contribute to human health. Food, water, living and working spaces, economics, and pest control.

92 **Medical Material Management** (3) Staff

Material management in the medical facility. Budget and budgeting process, expense operating budget, purchasing, material receipt and inspection, inventory of equipment and supplies, controlled medicinals, stock record cards, surveys and adjustments, classes of plant property, property accountability, storage requirements.

93 **Health Systems Administration I** (4)

Health systems organization. General office procedures, basic typi
methods, standard subject identification codes, filing procedures, reco
disposal, security of patient information, correspondence, procedu
manuals.

94 **Health Systems Administration II** (4)

Planning office systems, procedures, environment, and location. Qu
control, work measurement methods, authority and organizational re
tionships, principles of office organization, employee supervision.

95 **Records Management** (6)

Public health records management. Classification of personnel, perso
records, promotions, educational services, career development, person
orientation, medical care eligibility, patient data systems, statis
analysis.

96 **Clinical Experience** (arr.)

Supervised experience and research. Application of principles learned
didactic experience to the practical situation.

102 **Food and Water Sanitation** (4)

General characteristics of urban and rural water systems, treatment a
distribution, public bathing place sanitation, design and function
water treatment facilities. Dairy products and food sanitation. Process
storing, and distributing food. Supervision and training of food indus
personnel.

109 **Human Behavior I** (2)

Introduction to psychiatric assessments and to ways of understanding
working with a variety of patients. Problem-solving techniques are emp
sized through the use of conceptual models. (Fall)

110 **Anatomy for New Health Practitioners** (3)
(Formerly Structure of the Human Body)

Gross and microscopic make-up of the human body and the major org
systems: cellular, musculoskeletal, nervous, endocrine, cardiovascu
respiratory, gastrointestinal, urinary, reproductive, and integrated. Kno
edge of structure at the cellular level is used to develop understanding
the organization of the human body at tissue, organ, and organ sys
levels. Disease processes and clinical applications are considered. Labo
tory work is limited to prosected anatomical demonstrations.

113 **Medicine and Society** (1)

Current topics of interest to the health care professional. The student
develop an understanding of his or her role in the health care system
how that role may be developed in the future. (Spring)

116 **Medical Terminology** (arr.)

Terminology and vocabulary basic to all areas of medical science,
pital services, and allied health specialties. (Fall)

119 **Patient Care I** (arr.)

Clinical interviewing (or history taking), and physical examinati
designed to permit the student to achieve a beginner's level of clini
competence, defined in terms of attitudes and behavior, clinical skills,
fundamental knowledge. (Fall)

125–26 **Manifestations of Disease** (arr.) Staff

An intradisciplinary course presenting the pathologic and abnormal structure and function encountered in clinical disease states. A functional approach to clinical medicine, including sign symptoms and diagnosis of disease states. Prerequisite: HCS 110, 112; Phyl 111. (Spring)

131 **Human Behavior II** (2) Staff

Continuation of HCS 109. Prerequisite: HCS 109. (Spring)

134 **Patient Care II** (2) Staff

Continuation of HCS 119. Prerequisite: HCS 119. (Spring)

137 **Issues in Health Care** (1) Pawlson

The focus of the course will be on the interface between the individual practitioner-patient interaction and the various forces of society which have a major impact on the practitioner and the patient. The contribution of law, ethics, economics, and government to the health care system will be introduced in lectures and panel discussions, and illustrated with case reports. (Spring)

140 **Clinical-Pathological Correlation** (0) Staff

Three hours a week for 8 weeks. Format for case presentations and proper method for clinical integration of signs and symptoms of disease. Prerequisite: HCS 116. (Spring)

142 **Nurse Practitioner Seminar I** (2) Silverman

Family dynamics, role resocialization, and current issues influencing development of the nurse practitioner role.

143 **Nurse Practitioner Seminar II** (3) Silverman

Continuation of HCS 142.

144 **Nurse Practitioner Seminar III** (1) Silverman

Continuation of HCS 142 and 143.

145 **Primary Care and Therapeutics** (3) Staff

(Formerly Management of Primary Care Problems [2])

Common office pediatric and adult medicine problems. Lectures, case presentations, and audiovisual presentations.

146 **Surgical and Diagnostic Procedures** (1) Staff

(Formerly no credit)

Fundamentals for performing several diagnostic and surgical procedures. Basics for preparation and execution of procedures such as venipuncture, suturing, intravenous infusion. Proper surgical decorum, development of working knowledge of various surgical instruments and sutures. (Spring)

147 **Radiology** (1) Staff

Emphasis on basic language, science, and principles of radiology, including such aspects as safety, positioning, protection-requesting studies, etc. Basic elements of topographic anatomy as applied to radiology. The differentiation of abnormal from normal on chest, abdominal, and extremity films. Basic pattern recognition along with a systematic approach to each x-ray interpretation. (Fall)

148 **Electrocardiography** (1) Staff

Emphasis on the performance of a technically competent electrocardiogram by each student. Basic theory behind electrocardiography as well as

interpretation of basic EKG patterns. Common errors of taking and re
ing EKGs. Identification of common normal and abnormal wave patter
on EKGs. Value and appropriate use of echocardiography and pho
cardiography. Principles of performing simple exercise tolerance test

151 **Clinical Pharmacology** (1)
(Formerly two credits)
Day-to-day clinical situations for discussion of the appropriate use
some of the more common drugs in a primary care practice. Dosag
actions, routes of administration, indications, and contraindications
applied to specific clinical examples. Advantages, disadvantages,
reasons for deciding on the primary drug and possible alternative thera
When and how to use *PDR*. Review and discussion of the importa
and advantages of taking an accurate and complete drug history. P
requisite: Phar 158. (Summer)

153 **Gynecology Outpatient: Nurse Practitioner** (3)
Three-week required rotation for nurse practitioner students. Manag
ment of gynecological problems in ambulatory setting.

154 **Gerontology Practicum** (arr.)
(Formerly Independent Study)
Elective rotation for nurse practitioner students. With guidance
approval of advisor, students develop individual study and lear
objectives.

157 **Primary Care Preceptorship: Nurse Practitioner** (6)
Six-week required rotation for nurse practitioner students. All aspect
patient management in ambulatory setting.

160 **Medical Inpatient** (5)
Six-week rotation in which the student learns to recognize, collect,
integrate information regarding the medical problems of a hospitali
patient. The student works on the medical ward with a patient care
under the supervision of the medical resident and/or attending ph
cian. Initial patient evaluation data base (history, physical, appro
diagnostic and therapeutic procedures) and assistance with inpatient
agement. Daily rounds with emphasis on the basic approach to diag
treatment pathophysiology, and prevention of disease. The Problem
ented Medical Record System is used. Attendance is required at all
rounds, teaching rounds, noon conferences and grand rounds of the m
cal service. Students stand regular call status.

163 **Medical Outpatient** (5)
Six-week required rotation in which the student learns to recognize,
lect, and integrate information regarding various medical proble
encountered in an ambulatory setting. Common ambulatory problem
both acute and chronic nature. The student is assigned to an ambula
setting such as outpatient clinic, HMO, or community health center.
patients are evaluated with staff assistance and follow-up visits are sup
vised by the staff. Emphasis on differential diagnosis, utilization of a
latory facilities, patient management, and preventive medicine.

165 **Medical Outpatient: Nurse Practitioner** (arr.)
Required rotation for nurse practitioner students, arranged with app
of advisor. All aspects of patient management in ambulatory setting

166 **Surgical Inpatient** (5) **Staff**

Six-week required rotation in which the student learns to recognize, collect, and integrate information relating to the surgical patient. Students are given in-depth experience in the pre-operative and post-operative management of the surgical inpatient; they are taught to perform a pre-operative workup, make progress notes, and participate in operative procedures under close supervision of the surgical staff. The student is also expected to stand call. Attendance by the student at all surgical rounds is mandatory.

169 **Obstetrics and Gynecology** (5) **Staff**

Six-week required rotation in which the student learns to recognize, collect, and integrate information regarding the obstetrical and gynecological patient. Students work up and follow patients on the obstetrical and gynecological service, and assist in deliveries and gynecologic/obstetric procedures. Students attend all regularly scheduled obstetric and gynecologic ward rounds, conferences, and seminars conducted by the staff.

170 **Obstetrics: Nurse Practitioner** (2) **Staff**

Two-week elective rotation for nurse practitioner students. With guidance and approval of advisor, students develop individual study and learning objectives.

171 **Pediatric Outpatient: Nurse Practitioner** (3) **Staff**

Three-week rotation for nurse practitioner students. Ambulatory pediatric practice.

172 **Pediatric Outpatient** (5) **Staff**

Six-week required rotation in which the student learns to recognize, collect, and integrate information regarding medical problems of the pediatric outpatient. Students are assigned to a pediatric outpatient setting under the direction of a physician where they learn normal childhood development, history-taking, and physical examination of infants and children. The student also develops skills in the management of common childhood illnesses and in parental counseling.

175 **Primary Care Preceptorship** (arr.) **Staff**

Required rotation for allied health students. All aspects of primary care medicine. Hospital rounds with attending physicians.

178 **Emergency Medicine** (5) **Staff**

Six-week required rotation in which the student learns to recognize, collect, and integrate information regarding the emergency patient. Students have rotation shifts to ensure maximum exposure to patient load and clinical experience. Opportunity to deal with a variety of acute life-threatening, traumatic, and psychiatric emergencies. Surgical and medical emergency management problems under the supervision of the emergency room physicians. Attendance is required at all applicable conferences.

179 **Emergency Medicine: Nurse Practitioner** (2) **Staff**

Two-week rotation required for nurse practitioner students. Medical and surgical emergency management problems.

180 **Practicum in Environmental Health** (10) **Staff**

Supervised fieldwork. Food service, housing, water, sewage and solid waste, and infectious diseases. Occupational health problems. Reports and conferences.

193 **Issues in Aging** (3)

Seminar on the nature and problems of aging, including social, biolog cal, economic, legal, and health care needs. Guest lecturers include pr fessors from several University schools and experts from affiliated insti tions and the community. Designed primarily for graduate students the social sciences and health care administration and for students in th medical school. (Fall and spring)

194 **Practicum in Gerontology and Geriatric Care** (arr.)

Supervised fieldwork with the elderly or in administration and planni for the elderly. Offered in cooperation with other schools and depa ments of the University. Primarily for undergraduate and gradu students in the social sciences and health care administration, and f students in the medical school pursuing the B.S. with a concentration gerontology degree. Open to others with departmental approval. (Fall and spring)

195 **Second Careers in Health Care** (arr.)

Lectures, discussions, and fieldwork (eight to 12 hours per week) d signed to help older students who are seeking second careers in the hea field to make realistic career choices. Health care career and traini opportunities and personnel needs. (Fall and spring)

196 **Issues in American Health Care** (arr.)

Fieldwork combined with academic study of the present American he care system and its problems: cost, quality of care, delivery of ca ethical issues, health education, consumer issues. Field placements 20 hours per week) in appropriate health-related activities. Admission permission of instructor. (Fall and spring)

198 **Psychiatry** (5)

Six-week required rotation in which the student learns to recognize, lect, and integrate information regarding the psychiatric inpatient. Iden cation and management of psychiatric illness. Teaching rounds, sm group seminars, and grand rounds provide instruction in psychopath and treatment methods. As an integral part of the treatment team, the dent participates in the care of the psychiatric patient, working c with the faculty, learning to elicit information from the patient and family, and interpreting findings.

199 **Independent Study** (5)

Clinical rotation in area chosen by individual student. Objectives for sen area determined before enrollment. Advisor's approval required area of study and learning objectives.

230 **Emergency Medicine I** (1)

Required course for first-year medical students. Didactic presentation guest speakers on general principles in the pre-hospital care and hand of victims of accident and illness. Emphasis on pre-hospital manage of typical emergencies. Patient assessment, cardio-pulmonary resu tion, bandaging and splinting, lifts and carries, intravenous therapy parenteral drug administration. Opportunities to practice psychom skills and rescue techniques during regularly scheduled practicum sions. (Spring)

231 **Emergency Medicine II**

Elective continuation of HCS 230. The student is expected to develop proficiency equivalent to that of an emergency medical technician. Opportunities to spend time in the University Emergency Room and ride on either a basic life support ambulance or mobile intensive care unit with the instructor. After successful completion of Emergency Medicine I and II, the student is awarded an Emergency Medical Technician certificate by the University.

301 **Clerkship in Primary Care** (10) Staff

Required for third-year medical students. Care of patients in ambulatory setting. Includes participation in University's prepaid health plan (HMO), emergency room, and office practice of general internists, general pediatricians, and family practitioners. Emphasis on specialty skills which contribute to physician's capacity to care for common minor illnesses. Office practice of orthopaedics, otolaryngology, dermatology, and ophthalmology. Participation with District of Columbia Fire Department in responding to ambulance calls. Lecture series provides foundation for office management of common illnesses in ambulatory setting. 8-week elective periods throughout the academic year.

350 **Ambulatory Health Care** (5) Guarinello

For senior medical students. Research or clinical experience in primary medical care. 4-week elective periods during which students participate in projects such as medical audit, study of organization of health services, and problems of underserved populations. Exchange with similar program in other institutions is possible, especially for those participating in model family practice units.

360 **Emergency Health Care** (5) Pawlson

For senior medical students. Assignment to an emergency room in the District of Columbia. Instruction by full-time and resident emergency-room staff. Emphasizes cardio-pulmonary resuscitation and management of trauma, drug overdose, coma, and common illnesses and injuries in emergency care setting. 4-week elective periods. Limited to two students per period.

361 **Family Practice Preceptorship** (5)

Students spend four to eight weeks in a family practice preceptorship in rural Garrett County, Maryland. Supervision is by board-certified family practitioners in the Garrett County Medical Center. The physicians are affiliated with the University of Maryland Family Practice Program of which this site is a part.

369 **Issues in Health Care** (1)

The focus of the course will be on the interface between the individual practitioner-patient interaction and the various forces of society which have a major impact on the practitioner and the patient. The contribution of law, ethics, economics, and government to the health care system will be introduced in lectures and panel discussions, and illustrated with case reports. Required for second-year medical students.

370 **Mental Health Provision in the Primary Care Setting** (5) Sank

For senior medical students who seek clinical experience in a multi-disciplinary mental health practice, with emphasis on the short-term treatment

of patients commonly presenting in a primary care setting. Students
exposed to such problems as sexual dysfunction, depression, and psyc
somatic symptoms as they are presented in an ambulatory care set
The student is given the opportunity to perform initial evaluations,
serve groups, follow patients, and provide consultation to primary
teams. Limited to one student per session for a minimum 6-week elect
period.

390 **Extramural Health Care Sciences Elective** (arr.)

The department makes arrangements for students to spend one or tw
elective periods at other institutions. Approval of the department cha
man required.

Interdisciplinary Courses

First-year medical students are required to take Idis 212 *Neurobiology*,
ministered by the Departments of Anatomy and Physiology.

212 **Neurobiology** (5)

Same as Anat 212 and Phyl 212. Integrated survey of the structure
function of the human nervous system; lecture, clinical demonstrat
and laboratory.

Introduction to Clinical Sciences, an interdisciplinary program, is required
medical students in the second year. By means of lectures, panel discussio
seminars, case presentations, demonstrations, and examinations of patients
provides students with basic instruction in various clinical subjects and prep
them professionally and personally for the clinical clerkships and career c
tives in the third and fourth years. The program is coordinated by a task fo
appointed by the Committee on Educational Policy of the School of Medi
and Health Sciences. The task force consists of representatives from the
partments responsible for teaching courses in the program: Anne Thomps
Department of Medicine; James Straw, Department of Pharmacology; Wind
Scott, Dean's Office; Frank Miller, Department of Pathology (*Chairm*
Cheryl Dunn, Department of Psychiatry and Behavioral Sciences; and T
O'Toole, second-year student. In addition to Idis 301 (see below), the prog
consists of Path 201, Phar 201, HCS 137, and Pchi 201.

301 **Introduction to Clinical Medicine** (16)

One-year course. Integrated, organ-oriented course. Fundamental
struction in anesthesiology, child health and development, dermatol
gynecology, internal medicine, neurology, obstetrics, ophthalmology,
chiatry, radiology, and surgery; emphasis on physical diagnosis.

Medical and Public Affairs

Chairman: M. Head

Professors M. Head, D.J. Sharpe

Associate Professors F.J. Kavanaugh *(Research)*, R.H. Ross *(Research)*, E. Waters, Jr. *(Research)*

Assistant Professors I.C. Mohler, Jr. *(Research)*, S.S. Rogers *(Research)*

351 **Law and Medicine** (2) Sharpe, Head, Fiscina
(Formerly Forensic Medicine)
Open to 2nd-year medical students. Problems arising when the professional interests of lawyers and physicians overlap. Malpractice, personal injury litigation, licensure and discipline, ethics and economics, hospitals and other institutions, and compelled treatment. (Spring)

Medicine

Chairman: J.C. Rios

Directors of Divisions: H.E. Ratcliffe *(Allergy)*, A.M. Ross *(Cardiology)*, W.O. Dobbins III *(Gastroenterology)*, L.S. Lessin *(Hematology-Oncology)*, C.U. Tuazon *(Infectious Diseases)*, K. Wipplinger *(Internal Medicine)*, K.L. Becker *(Metabolic and Endocine Diseases)*, S.V. Spagnolo *(Pulmonary Diseases)*, I.G. Tamagna *(Rehabilitation Medicine)*, A.E. Parrish *(Renal Diseases)*, W.R. Felts, Jr. *(Rheumatology)*

Professors M.J. Romansky, J.M. Evans, C.S. Tidball *(Research)*, A.E. Parrish, F.W. Wolff, I.G. Tamagna, J.J. Feffer, T.E. Piemme, L. Bernstein, G.A. Kelser, Jr., H.V. Pipberger, H.J. Zimmerman, J.A. Curtin, R.P. Kaufman, T.O. Cheng, F. Leonard *(Research—Rehabilitation Medicine)*, W.O. Dobbins III, J.M. Bacos, E.R. Simon, A.C. Hollinshead *(Research—Pharmacology)*, N.C. Kramer, J.D. Finkelstein, L.S. Lessin, W.P. Baker, W.M. Lukash, D. Reiss, K.L. Becker, W.F. Barth, V.T. DeVita, G.D. Eng, I.I. Hsu, M. Mourad, L. Pierce, H.E. Ratcliffe, D. Castell, M. Elgart, F.M. Muggia, R.C. Reba, J.C. Rios, J. LaRosa, J. Lindsay, Jr., A.M. Ross

Clinical Professors J.J. Rheingold, T.S. Sappington, A.B. Rosenbaum, T.J. Greenwalt, M.H. Stolar, C.W. Thompson, M. Gusack, E.P. Parker III, H.M. Silver, S.D. Loube, M. Fuchs, B. Nelson, H.L. Kamenetz, F.J. Murray, A. Baer, S.H. Danovitch, F.A. Finnerty, N.P. Trujillo, M.S. Wolfe

Adjunct Professors J.P. Naughton, V.L. Nickel, J.N. Sheagren

Professorial Lecturers W.C. Roberts *(Cardiology and Pathology)*, S.M. Fox III, D.S. Fredrickson, H.A. McAllister

Associate Professors W.R. Felts, Jr., J.B. O'Connell, K. Wipplinger, P.A. Gorman, W.H. Scott, P. Witorsch, R. Keimowitz, D.S. O'Leary, G.P. Schechter, W.P. Fortune, M.S. Gold, S.V. Spagnolo, J.E. Zimmerman, G.S. Folsom *(Research)*, P.M. Berkman, W.S. Chiu, P.P. Klug, P. Cohen, D.W. Dew *(Research)*, B.E. Fossieck, Jr., A.L. Ginsberg, R.A. Goldstein, K. Goldstein, H.J. Gorfinkel, K. Mallik *(Research)*, P.D. Kind, A.M.S. Thompson, C.U. Tuazon

Adjunct Associate Professors L.W. Marshall, A.P. Belmont, W.T. Friedewald, E.A. Jones

Associate Clinical Professors J.W. Latimer, Jr., H.D. Ecker, C.W. Jones, M. Mensh, M.H. Rosenberg, J. Kleh, J.P. Mann, E. Adelson, A. Ruskin, L.J. Thomas, W.O. Bailey, Jr., R.B. Benedict, S.W. Kirstein, I. Kessler, W.D. Bro... C.A. Schulman, J.M. Pisani, J. King, M.H. Jacobson, R. Standard, E.J. Leonard, J. Fenton, P. Birk, R.B.W. Smith, L.B. Hobson, A.W. Danish, A. ... Lear, O.W. Donnelly, S.J. Talpers, R. Scalettar, R.S. Wilkinson, D.A. Mor... witz, N.L. Christopher, G.H. Nachnani, R.A. Fischer, R.M. Kaufman, M.J. Stern, L.M. Weiss, R.K. Sarin, D. Ein, D.A. O'Kieffe, J.R. Shapiro, P.A. Holland, S.J. Wolin, J.B. Calatayud, B. Grand, D.R. Rosing, H.C. Sau... J.W. Walsh, G.S. Belaval, J.F. Mermel, G.R.G. Werth, A. Seltzer, J.F. Meyer, I.N. Tublin, A. Guha

Associate Professorial Lecturer J.C. Penhos

Assistant Professors C.H. Chan, M.H. Cohen, S.H. Mendelson, H.B. Marsh, K.H. Chase, D.B. Gail *(Research)*, F.H. Corcoran, R.D. Gaskins, L.F. Georges, E. Perlin, I. Scher, O.C.L. Silva, N.W. Lindenmuth, A.N. Amig... ble, L.D. Bohan, D.F. Fragnul, A.W. Stone, E.C. Flores, J.C. Donaldson, J. Braun III, J.H. Gaskin, R.P. Jacobs, W. Kurland, M.H. Lin *(Research)*, R. ... Saunders, S. Scott, Jr., M.A. Araoye *(Research)*, D.S. Edge, N.Z. Finste... M. Enders, D.E. Fleischer, B.J. Gaffney, T.V. Kuzmowych, R.F. Levine, D.G. Borenstein, M.D. Delaney, N. Kimani, H.N. Wall, Jr., R.A Muesing *(Research)*, M.A. Parker, L.H. Pierce, Jr., M.I. Robinson, M. Rozencwaig *(Research)*, F.M. Ryan, C.T. Spiegel, J.H. Stuckey, P.J. Warchol

Adjunct Assistant Professor D.M. Poretz

Assistant Clinical Professors D. Horwitz, M.H. Rose, A. Friedman, J.W. Long, T.L. Hartman, B. Rabkin, C.E. Law, Sr., H.O. Mott, N.H. Rubenstein, B.H. Ostrow, W.R. Ehrmantraut, G.A. Chapman, S. Babin, Jr., J. Crowe, F.K. Harris II, R.F. Dyer, H.I. Passes, R.S. Poole, M.A. Sislen, G.T. Fo... nomos, I. Ardam, S.E. Barr, H.A. Moskovitz, J.T. Hagenbucher, G.N. Pa... J.P. Lucas, F. Chucker, L.H. Biben, W.H. Harvey, W. Kurstin, L.H. Fento... P. Schlein, D.J. Hand, P.A. Haber, G.J. Thorpe, C. Rudzki, H.C. Singe... E.B. Thompson, R. Schoenfeld, M.M. Shefferman, A.M. Mondzac, B. Kot... lanski, R.J. Karpiek, M.S. Maillis, W.Y.K. Goo, M.J. Halberstam, S.N. K... man, T.P. Dwyer, S.M. Fidler, A. Muller, A. Segal, B.L. Manalo, P.G. Ventu... M. J. Haut, R.A. Nicklas, R.F. Cioffi, F. Meyers, R.W. Turner, S.A. Schwar... L.F. Barker, D.D. Haut, P.P.L. Chang, H.S. Mirsky, J.A. Kark, J.N. Rand... D.B. Simon, R.A. Noble, H.A. Schwartz, P. Assatourians, C.J. Bier... Brandes, R. Evans III, S.G. Goldberger, A.A. Oboler, M. Phillips, J.D. Rob... son, G.W. Ward, Jr., I. Weiszer, D. Yoo, C.B. Abrams, L.F. Bentolila, S.... Berk, K.J. Dickie, L.J. Eron, A. Frank, S.D. Goldberg, M.A. Herman, J.... Mulhauser, M.A. Newman, A.A. Nimetz, R.J. Osheroff, D.N. Robins, J.... Seymour, A.B. Shauer, B.E. Sherwin, T.G. Sinderson, B.K. Singh, I.T. Solan... J. Taubin, M.L. Turner, B. Arling, E.A. Beeman, R.A. Berenson, B.L. Burk... H.D. Capone, M.I. Cinnamon, G.B. Cushner, R.A. DiGioia, N.E.S. Falk, S.... Fredd, D.H. Goodman, A. Grollman, T.C. Havell II, S.H. Houseman, B.... Heckman, S.K. Irani, P.C. Latkin, P.H. Levine, A.G. Levy, D.C. Marcu... B.A.M. Meyers, M. Mohamadi, J.A. Ocuin, G.M. Orr, N.S. Otchin, S.W...

Park, J.S. Putnam, A. Rotsztain, I. Spector, M. Stock, D.H. Waterman, L.A. Wisneski, K.Y. Yeung

Assistant Professorial Lecturer C.D. Furberg

Instructor A.G.S. Fry *(Research)*

Clinical Instructors N.K. Bohrer, N.G. Goodman, L. Ruckstuhl, R. Kramer, D.W. Datlow, R.M. Huffman, L.P. Appel, N.T. Connally, J.C. Perkins, H.J. Alpert, S.R. Rishi, D. Ramaswamy, D.F. Millon, N.A. Crane, B. Choi, N. Mendjuk, P.S. Spiegler, V.T. Miller, I.V. Magal, M. Kavalier, M.G. Mukhopadhyay, B.P. Tinker, A.L.B. Williams, N. Gonzalez, B.E. Lessin, B.A. Lowen, A.S. Lai, E. Rodriguez, R.S. Waldman, H. Gordon

Adjunct Instructors H. Hechel, D.J. Lynn, S.E. Pomerantz

Special Lecturers S. Katz, B.W. Janicki

303 **Computers in Clinical Cardiology** (5 or 7) Rios

Introduction to and review of computer tools in electrocardiography with emphasis on clinical applications. The course will include a review of lead systems (orthogonal vs. 12 lead), clinical applications of computer-derived analysis, and computer techniques. Software for computer analysis of systolic time interval data, interpretation of resting ECGs (emphasis on Pipberger AVA program), and exercise electrocardiograms (emphasis on Rios program) will be discussed. For those technically inclined, multivariate techniques in pattern recognition and diagnosis can be discussed. 4- or 6-week elective periods. Univ. Hosp.

*305 **Inpatient Clerkship** (10) Staff

Comprehensive study of patients; history and physical examination; ward rounds, consultations, conferences, preceptorial teaching, seminars. V.A. and Univ. Hosps., and Wash. Hosp. Center. (8-week periods throughout academic year)

308 **Outpatient Medicine and Emergency Room** (10)

Care of ambulatory patients and emergency cases under close supervision. Daily clinics in general medicine and various specialties; conferences on current cases. 8-week elective periods.

332 **Acting Intern in Medicine** (5) LaRosa

Student is assigned to a patient-care team by the Chief Medical Resident. Under supervision of ward team resident and attending physician, the student assumes an intern's responsibility for completing initial patient evaluation data base, writing medical orders (which must be co-signed by an M.D.), coordinating patient's care, writing progress notes, and dictating the discharge summary. Average patient load is six, allowing student sufficient time to study patient problems as well as to attend medical service conferences. Since acting interns assume primary patient responsibility, they cannot leave their teams for vacations or internship interviews. Group matches with Med 333 and 334. Univ. Clinic.

*Required for medical students.

Curtis

333 Acting Intern in Medicine (5)

Under the supervision of the medical resident and attending physician student works with a patient-care team on a medical ward, does initial evaluation, and presents patient's problem at attending rounds and appropriate teaching conferences. Subspecialty consultations also review patient problem with the student. 4-week elective periods. Wash. Hosp. Center.

Segal

334 Acting Intern in Medicine (5 or 10)

Students assigned to a patient-care team under direct supervision of University resident on general medical wards. Problem Oriented Medical Record System used. Students complete initial patient evaluation data base and are responsible for clinical management during hospitalization. They write all orders, which must be reviewed and co-signed by the resident, and are expected to present their patients at attending rounds and conferences. Close supervision and guidance by the team resident, attending physician, and subspecialty consultants. Interview required. 4- or 5-week elective periods. V.A. Hosp.

Wisneski

335 Acting Intern in Medicine (5)

Responsibilities of intern. Similar to Med 332. 4-week elective periods. Holy Cross Hosp.

Curtis

336 Intensive Care Medicine (5)

(Formerly Acting Intern in Intensive Care Medicine)

Student works on intensive care unit. 4-week elective periods. Wash. Hosp. Center.

Chas

338 Occupational Medicine (5)

Introduction to clinical and administrative aspects of occupational medicine in a field setting. Broad exposure to methods and approaches incorporating other medical disciplines. Opportunity to participate actively in specific areas including those concerned with environmental health. 4-week elective periods.

Parks

350 Clinical Infectious Diseases (5)

Fundamental concepts in the diagnosis and treatment of bacterial, viral, fungal, and mycobacterial infections. Students take primary responsibility in observing consultations; familiarization with advantages and limitations of laboratory techniques used to diagnose and manage infectious disease problems. Review of consultations seen by students by resident and full-time faculty members. Introduction to hospital infection surveillance program. 4-week elective periods. V.A. Hosp.

Tuazon

351 Clinical Infectious Diseases (5)

Clinically relevant aspects of microbiology and immunology; relevant aspects of patient history, physical and laboratory examinations. Students will learn to do infectious disease consultations and to use antibiotics intelligently. Minimum 4-week clinical rotation. Students electing a longer time period will assist with research project in infections in drug abuse, staphylococcal infections (especially endocarditis), clinical pharmacology of gentamicin or mechanisms of immunity in sickle cell anemia patients. Univ. Clinic.

352 **Clinical Cardiology** (10) — Hsu and Staff

Designed to provide experience in ambulatory and hospitalized patient care, ECGs, graphics, CCU, exercise lab; observation in cath lab and participation in hypertensive research clinic. 8-week elective periods.

353 **Clinical Cardiology** (10) — Manchester

Observation of and participation in the diagnosis and clinical management of cardiovascular disorders. Acquaintance with physical signs of heart disease. Exposure to noninvasive diagnostic procedures, echo-, phono-, apex-cardiography; interpretation of electrocardiograms and chest x-rays; ward rounds in intensive coronary care unit. 8-week elective periods.

358 **Clinical Cardiology** (5) — Bacos, Mendelson, Marsh, Lindsay

Bedside evaluation is emphasized and correlated with special diagnostic studies, including stress testing, phono-cardiography, echo-cardiography, cardiac catheterization, angiography, etc. 4-week elective periods. Wash. Hosp. Center.

359 **Coronary Care Unit** (5) — Bacos, Mendelson, Marsh, Lindsay

Participation in patient care. Students work closely with house staff and attending staff. Emphasis on diagnosis and treatment of coronary disease, complications of infarction, diagnosis and treatment of arrhythmias, and selection of patients for surgical intervention. 4-week elective periods. Wash. Hosp. Center.

360 **Clinical Cardiology** (5) — Fletcher*

Experience in clinical cardiovascular problems under supervision of cardiology staff. Emphasis on history, physical diagnosis, and noninvasive cardiovascular techniques. Role of cardiac catheterization explained and results in specific cases discussed. Electrocardiography covered as one of the tools used to approach the cardiovascular patient. Patient management is integral part of course. Teaching rounds and conferences. 4-week elective periods. V.A. Hosp.

363 **Cardiac and Medical Intensive Care** (5) — Saunders†

Students take call every third night with a resident/intern team. Participation in all aspects of coronary care and familiarization with special unit techniques such as cardioversion, pacemakers, Swanz-Ganz catheters, intra-aortic balloon counterpulsation and mechanical ventilators. Opportunity for supervised management of a spectrum of other critical illnesses. 4-week elective periods. V.A. Hosp.

364 **Cardiovascular Data Processing** (5) — Pipberger

Study of a variety of modern computer techniques; primary research in computer analysis of electrocardiograms. 4-week elective periods. V.A. Hosp.

365 **Clinical Electrocardiography and ECG Computer Analysis** (5) — Pipberger

Participation in daily computer processing and analysis of all electrocardiograms from two V.A. hospitals and Children's Hospital. ECG findings

* Dr. Fletcher is Chief of Cardiology at the Veterans Administration Hospital.
† Dr. Saunders is Assistant Chief of Medicine for Intensive Care at the Veterans Administration Hospital.

correlated with clinical data from all problem cases. Daily review sessi
with section chief and cardiac fellows. Participation in weekly semin
and a Journal Club. 4-week elective periods. V.A. Hosp.

Gad

371 **Endocrinology** (5)

Student evaluates patients referred to the endocrinology service, takes p
in planning diagnostic work-ups or therapy programs, and is respons
for case presentations and follow-up. Clinical rounds are held daily,
endocrine clinic and diabetic clinic are held weekly. The endocrine con
ence includes Journal Club once a month and pediatric endocrinolog
Children's Hospital once a month. Rounds and conferences at the V
and at G.W. Hospitals are included when possible. 4-week elective perio
Wash. Hosp. Center.

Bec

373 **Endocrinology and Metabolism** (5)

Clinical experience in endocrinology and metabolism. Students exam
endocrine patients, make preliminary diagnoses, and assist in treatme
Clinical rounds daily; weekly endocrine clinic, diabetic clinic, and Jour
Club participation; laboratory and research experience available. 4-w
elective periods. V.A. and Univ. Hosps.

Becker and St

375 **Endocrinology Research** (10)

Participation in endocrinology and metabolism research laboratory.
troduction to chemical and technical aspects of endocrine research.
ticipation in ongoing research activities. Students learn appropriate
cedures, such as radioimmunoassay of hormones, histopathologic tech
atomic absorption spectrophotometry, and investigative approach to
ing research problems. Prior interview with instructor suggested. 8-w
elective periods. V.A. Hosp.

Pen

376 **Metabolic Disorders in Diabetes** (5)

Intensive and practical studies of the technique to examine surgical, ch
cal, and hormonal diabetes. Participation in research on carbohyd
protein, and lipid metabolism, insulin secretion in isolated organ perfu
Seminars and participation in Journal Club; discussions on the re
obtained. 4-week elective periods. V.A. Hosp.

Pen

381 **Research in Endocrinology** (5)

Participation in endocrine research, including laboratory experience, exp
mental surgery, biochemical methods, and *in vivo* and *in vitro* endocr
studies. Weekly seminars and discussions correlate experimental re
with clinical observations. 4-week elective periods. V.A. Hosp.

390 **Extramural Internal Medicine Elective** (arr.)

The department arranges for students to spend elective periods at
institutions. Interested students should contact the chairman of the
partment.

Ch

391 **Clinical Oncology** (10 or 15)

Participation in clinical management of patients with carcinoma o
medical oncology ward. 8- or 12-week elective periods. V.A. Hosp.

Yo

393 **Medical Oncology** (10)

Current methods in evaluation and treatment of lymphomas, ch
leukemias, ovarian, breast, and other malignancies, including a vi

the broad spectrum of these diseases. Participation in patient care and laboratory studies of current research in clinical pharmacology, tumor kinetics, and *in vitro* marrow culture techniques. 8-week elective periods. Nat'l Cancer Institute, NIH.

396 **Clinical Pharmacology** (15) Wolff

Introduction to clinical pharmacology and toxicology as the basis of the regulatory work of the Food and Drug Administration. Collaboration with a team of scientists reviewing investigational new drug applications with a drug experience reporting system, and with annual reviews of drugs in specific areas, emphasizing study of the benefit/risk ratio. Project work in a toxicology laboratory. Interview required. 12-week elective periods. Bureau of Drugs, FDA.

402 **Research in Cancer Immunology** (10) Hollinshead

Laboratory experience with tests used to correlate cellular anti-tumor reactivity to solid tumors with the clinical course of the disease; experiments to investigate viral etiology of certain forms of cancer; study of fetal antigens and role in oncogenesis; cell membrane antigens specific for leukemia. 8-week elective periods. Ross Hall.

412 **Clinical Gastroenterology** (5) Staff

Work in a suburban office devoted to private partnership practice of internal medicine with emphasis on gastroenterology. Hospital rounds, evaluation of problems, discussion with attending physician and patient of diagnosis and therapy, observation of and assistance in specialized procedures, practical aspects of office management. 4-week elective periods.

413 **Clinical Gastroenterology-Hepatology** (5) Dobbins

Intensive clinical experience with patients who have digestive diseases, including those of the gastrointestinal tract, liver, and pancreas. Patient consultations, teaching rounds, seminars. Joint conferences with surgery, pathology, and radiology staffs emphasize multidisciplinary approach to digestive diseases. 4-week elective periods. Univ. Clinic.

414 **Clinical Gastroenterology-Hepatology** (5) Finkelstein

Students see patients referred to the gastroenterology-hepatology section for consultation and are responsible for initial evaluation and the follow-up of these patients. Participation in all specialized procedures, including various biopsy techniques and endoscopies. Teaching rounds, conferences, seminars. 4-week elective periods. V.A. Hosp.

415 **Clinical Gastroenterology** (5) Gold

Course includes direct patient contact on a consultative basis, and participation in all section activities, including reviews of gastrointestinal pathology and radiology for individual patients, and all procedures, particularly endoscopic. The student will be expected to develop a fundamental core knowledge of basic gastroenterology and to participate in a journal activity, and may be called upon to participate in a case presentation at monthly joint GI Grand Round sessions. 4-week elective periods. Wash. Hosp. Center.

423 **Clinical Gastroenterology** (5) Trujillo

Introduction to clinical problems in diagnosis and treatment of gastroenterology in both office and hospital practice. Peritoneoscopy, endoscopy, and biopsies. 4-week elective periods. Univ. Hosp.

424 **Morphology of the Liver and Intestines** (10) Dob

Research designed to acquaint the student with a variety of morphol techniques used in the study of mucosal disease of the gastrointes tract. Includes electron microscopy and light microscopy techniq phase and fluorescent microscopy. Preference given to students abl continue on a part-time basis following completion of the elective. 8- elective periods. Univ. Clinic.

426 **Research in Metabolism of Sulphur Amino Acids** (15) Finkels

Study of methionine metabolism in mammalian tissues using several search techniques: kinetic properties of purified enzymes; induction repression of enzymes by hormones and diet; metabolism of methio in the isolated perfused rat liver. Projects available in any of the ab areas and will be developed further to meet student needs. 12-week tive periods. V.A. Hosp.

430 **Clinical Hematology** (5) Schechter* and S

Participation in the evaluation and treatment of patients with hemato cal disorders. Ward rounds, morphology review sessions, participat hematology clinic and Journal Club. 4-week elective periods. V.A. H

431 **Clinical Hematology and Oncology** (5) Lessin and S

Participation in the diagnosis and therapy of hematologic and onco disorders, including in-patient and out-patient consultations, daily and follow-up of clinical hematologic problems. Emphasis on acqu ing the student with modern hematologic diagnostic procedures and rent literature. 4-week elective periods.

Pi

432 **Clinical Hematology** (5)

Clinical evaluation of in-patients and out-patients with symptom ferrable to the myelopoietic system using bedside and laboratory inv gative parameters. 4-week elective periods. Wash. Hosp. Center.

Rheing

433 **Hematology** (5)

Observation of and participation in diagnosis and treatment of pa with hematologic disorders. 4-week elective periods.

435 **Hematology Research** (10) Lessin and S

Participation in the hematology research laboratory. Emphasis velopment of the student's own project related to dynamic morpho of the blood cells, blood cell ultrastructure, and electron micro techniques. Introduction to red cell rheology and physiology. elective periods.

436 **Hematology Research** (10 or 15) Schechter* and

Possible topics include lymphocyte biology, platelet production and stasis, and hemolytic diseases and hemoglobinopothies. Facilities a to do *in vitro* culture of human peripheral blood and bone ma radioisotopic studies, and electron microscopy. 8- or 12-week elective ods. Interview required. V.A. Hosp.

Green

437 **Blood Transfusion in Clinical Practice** (5)

Demonstration and discussion of the preparation, properties, and cli use of the blood components and of the basic genetics and immunolog

* Dr. Schechter is Chief of the Hematology Section at the Veterans Administration Hospital.

the blood groups and allotypes. Opportunity to perform bench work in resolving immunologic transfusion problems. 4-week elective periods.

440 **Pulmonary Medicine** (5) Spagnolo

Participation in the diagnosis and therapy of patients with pulmonary disease; introduction to the management of patients with acute respiratory failure. Daily ward rounds, chest roentgenology review sessions, participation in Journal Club and physiology conference. Emphasis is placed on acquainting the student with modern pulmonary diagnostic procedures and current literature. 4-week elective periods. V.A. Hosp.

442 **Pulmonary Diseases** (5) Witorsch

Performance and interpretation of pulmonary function studies, including ventilatory, diffusing capacity, and blood gas analysis; daily teaching rounds and supervised consultation on patients with various pulmonary and infectious diseases. Participation in pulmonary clinic; techniques and principles of inhalation therapy. Principles of and experience with respiratory failure and respiratory intensive care. 4-week elective periods. Wash. Hosp. Center.

447 **Pulmonary Medicine** (5) Spagnolo

Participation in the diagnosis and therapy of patients with pulmonary disorders. Ward rounds, chest roentgenology sessions, and participation in Journal Club. Emphasis on acquainting the student with modern diagnostic procedures related to patients with pulmonary diseases and current literature. 4-week elective periods. Univ. Hosp.

449 **Primary Care Elective** (5 or 10) Arling

Students assigned to European-trained family practitioner in small town on a Bahamian out-island. Caring for patients with medical, surgical, pediatric, obstetrical-gynecological, psychiatric, and tropical disease problems. Students responsible for their own transportation. Housing may be provided. 4- to 8-week rotations. Open to two students each period.

450 **Rheumatology Research** (10) Jacobs

Participation in ongoing research activities in rheumatology research laboratory, including methods of early diagnosis of septic arthritis, animal models of inflammatory joint disease, and alterations of collagen in destructive joint disease. 8-week elective periods.

451 **Arthritis and Rheumatic Diseases** (5) Felts, Jacobs

Introduction to clinical problems in the diagnosis and treatment of arthritis and rheumatic diseases. Emphasis on patient evaluation and establishment of therapeutic priorities. 4-week elective periods. Univ. Clinic.

452 **Clinical Rheumatology** (5) Alepa*

Active participation in work-up and management of in-patients and clinic patients with rheumatic diseases. History, physical examination, differential diagnosis, immunological mechanism, x-ray reading, and use of laboratory tests are stressed. Laboratory facilities available with emphasis on immunology. 4-week elective periods. V.A. Hosp.

*Dr. Alepa is Chief of the Rheumatology Section at the Veterans Administration Hospital.

453 **Introduction to Arthritis** (5)

Work-up, rounds, clinic, and consultations on patients with arthritis
rheumatic diseases. Daily discussions on selected topics in rheumatol
including clinical immunology, major disease categories (SLE, RA, g
etc.), differential diagnosis, drug therapy, serological reactions,
changes. 4-week elective periods. Wash. Hosp. Center.

454 **Total Patient Care** (5)

Participation in total patient care program, including medical rehabil
tion and group evaluation conferences. 4-week elective periods.
Hosp.

455 **Physical Medicine and Rehabilitation** (5) Chiu, Mourad,

Participation in all activities in in-patient and out-patient diagnosis,
ment, consultation, and EMG. 4-week elective periods. Univ. Hosp.

460 **Renal and Electrolyte Disorders** (5)

Participation in consultations on renal and electrolyte abnormalities;
low-up of patients. Examination of urinary sediment, peritoneal dial
and hemodialysis. Conferences, reading assignments, ward rounds,
pation in Journal Club. 4-week elective periods. Wash. Hosp. Center.

461 **Clinical Renal Disease** (5)

Participation in clinical and laboratory procedures used in the study
renal disease. Ward rounds, consultations, conferences, seminars. 4-
elective periods. Univ. Hosp.

463 **Clinical Application of Tissue Immunology** (5)

Application of immunologic methods to the study of human hyper
sitivity states and metabolic diseases; study of serum proteins, inclu
protein hormones and enzymes; research principles and methods;
typing and flourescent antibody methods. 4-week elective periods.
Hosp.

465 **Renal Diseases and Fluid and Electrolyte Problems** (5)

Participation in office and hospital consultations; care of patients
renal diseases and fluid and electrolyte problems. Familiarization
a variety of renal problems; work-ups of patients with renal dis
evaluation of renal function studies. Emphasis on critical use of med
literature. 4-week elective periods.

469 **Clinical Renal Disease** (5)

Broad exposure to and active participation in all the clinical activities
the renal section, including consultations, hemodialysis, outpatient cli
rounds, conferences, and Journal Club meetings. 4-week elective perio
Time period must first be cleared through instructor's office. V.A. Hosp

470 **Allergy Clinic** (5) Ratcliffe, Werth,

Lectures, conferences, and attendance at allergy clinic where both ad
and child patients are seen. Detailed history-taking, physical examinat

* Dr. Shalhoub is Chief of the Renal Section at the Veterans Administration Hospital.

and skin-testing techniques. The student will have the option of dealing in depth with an individual patient to learn more about the wide ramifications of severe allergic disease. Discussion of each case with an allergist and development of complete management program. 4-week elective periods. Univ. Clinic.

471 **Allergy Clinic** (5) Evans, Summers

Lectures, conferences, and attendance at allergy clinic where both adult and child patients are seen. Detailed history-taking, physical examination, and skin-testing techniques. Discussion of each case with an allergist and development of a complete management program. Emphasis on immunological procedures and research. 4-week elective periods. Walter Reed Hosp.

472 **Private Office Practice of Allergy** (5) Barr

4-week elective period.

474 **Private Office Practice of Allergy** (5) Seltzer

4-week elective period.

483 **Nuclear Medicine** (15) Sauerbrunn*

Introduction to radioisotope methodology as applied to diagnostic or therapeutic problems in medicine. Study of the unique properties of radioactivity, radiation safety, and instrumental uses in the detection of radiation. Evaluation of patients referred for diagnostic and therapeutic studies. Student may choose a selected field of interest for more intensive study and may engage in limited participation in on-going clinical research projects. 12-week elective periods. V.A. Hosp.

495 **Oncology Review** (5) Hollinshead

Each student is assigned a carefully selected reading list on one form of cancer. Fundamentals, basic research, and latest clinical approaches are discussed in detail. Each student will write and illustrate a review of his or her subject. Interested students are encouraged to undertake their own research project the following summer. 4-week elective period.

Microbiology

Chairman: L.F. Affronti

Professors R. Hugh, E.M. Lerner II *(Research)*, L.F. Affronti, K. Huang
Associate Professors M. Reich, P.D. Kind, Y. Chu *(Research)*
Adjunct Associate Professor J.D. MacLowry
Associate Professorial Lecturer R.F. De Giovanni-Donnelly
Assistant Professor W.J. Laird
Adjunct Assistant Professor C.E. Piper

* Dr. Sauerbrunn is Chief of Nuclear Medicine at the Veterans Administration Hospital.

106 **Environmental Science of Nosocomial Infection** (1)

Developing a surveillance protocol for nosocomial infection. Microb logical assay of the animate and inanimate components of the hospital vironment. (Spring)

128 **Microbiology for New Health Practitioners** (2)

Lecture course for students in allied health program. Basic concepts microbiology and principles of microbial defense. Study of microorg isms of medical importance.

151 **Public Health Microbiology I** (3)

Medical parasitology, protozoology (intestinal), the Haemosporidia (m laria), the Haemoflagellates, and the metazoa (helminths) of medi importance. (Spring)

152 **Public Health Microbiology II** (2)

Clinical bacteriology; characteristics and identification of the bacteria volved in disease; study of rickettsia and viruses. (Spring)

153 **Public Health Microbiology III** (2)

Study and identification of the flora of water, dairy products, food, and atmosphere. (Spring)

154 **Public Health Microbiology IV** (1)

Mycology: study of medically important fungi, systematic mycoses, dermatomycoses. (Spring)

*201 **Medical Microbiology** (8)

For medical students; open to qualified graduate students with perm sion. Bacteria, rickettsiae, viruses, yeasts, molds, protozoa, metazoa, a immunological concepts which relate to the health and disease of humans —cultural studies, methods of diagnosis, theories. Laboratory fee nonmedical students, $20. (Spring)

211 **Microbiology** (4)

For graduate students. Bacteria viruses, rickettsiae, fungi, parasites, v immunological concepts. Prerequisite or concurrent registration: Bi 221–22, or other biochemistry course, and permission of instructor. La oratory fee, $20. (Fall)

212 **Pathogenic Bacteriology** (3)

Principles of bacteriology and pathogenic characteristics of bacteria emphasis on pathogenesis, prevention, and control of bacterial diseas man. Prerequisite: Micr 211 or equivalent. Laboratory fee, $20. (Spri

214 **Tissue Cell Culture and Somatic Variation** (3)

(Formerly four credits)

Techniques of tissue culture and means of studying somatic variation Prerequisite: Micr 211 or equivalent. (Spring)

215 **Medical Parasitology (2)**

For graduate students; open to medical students. Study of host-paras relationships. Clinical recognition of important parasites in medica (Fall)

* Required for medical students.

219 **Scientific Writing for Graduate Students** (1) Staff

Required of all graduate students prior to writing a thesis or dissertation. Some research experience required. (Academic year)

223 **Antimicrobial Chemotherapy** (1) Affronti, Reich

For medical students. Lecture course. Selection, clinical applications, and mechanism of action of various drugs and antibiotics used in the treatment of microbial infections. Members of the clinical faculty discuss relevant aspects of clinical chemotherapy. Prerequisite: Micr 201. (Fall)

225 **Microbial Physiology I** (3) Reich, Affronti

Morphology and biochemistry of various microorganisms with emphasis on bacteria. Prerequisite: Bioc 201 or 221–22; Micr 211 or equivalent. (Fall)

226 **Microbial Physiology II** (3) Reich, Affronti

Effects of physical and chemical agents on microorganisms with emphasis on antibiotics. Prerequisite: Micr 225 or permission of instructor. (Spring)

229 **Immunology** (3) Kind, Affronti

Lecture course. Fundamental immunologic concepts. Lectures will cover antigens, antibodies, antigen-antibody reactions *in vitro* and *in vivo*, and the immune response. Prerequisite: Micr 211 or permission of instructor.

230 **Immunology Laboratory** (2) Kind, Affronti

Serologic and immunologic procedures as applied to clinical and research situations emphasized. Prerequisite or concurrent registration: Micr 229 or permission of instructor. Laboratory fee, $20. (Fall, odd years)

231 **Immunobiology** (1) Affronti, Kind

Lecture course. Study of immunological functions of reticulo-endothelial tissues, theories of autoimmunity, graft rejection, tumor immunity, delayed hypersensitivities, and immunogenetics. Members of the clinical faculty discuss relevant aspects of immunobiology. For medical students; open to graduate students with permission of instructor.

233 **Virology** (3) Huang

Biochemical, genetic, and pathogenic characterization of viruses. Prerequisite: Micr 211 or equivalent. (Fall)

234 **Virology—Laboratory** (2) Huang

Laboratory complement to Micr 233. Prerequisite or concurrent registration: Micr 233. Laboratory fee for nonmedical students, $20. (Fall)

235 **Systematic Bacteriology** (2) Hugh

History of bacterial classification, international rules of nomenclature as applied to bacteria, development of bacterial classification based on relationships, survey of characteristics of bacterial groups. Prerequisite: Micr 201 or 212 or equivalent. (Fall, odd years)

240–41 **Biomedical Instrumentation** (4–4) Staff

Same as Bioc 225–26 and Phyl 223–24. Comprehensive study of theoretical and practical application of biomedical instrumentation to the separation, identification, and quantification of materials of interest to biomedical and forensic scientists. Labratory fee, $50. (Academic year)

251 Clinical Laboratory Bacteriology (3)

For graduate students; open to medical students. Detection and identification of bacterial agents which cause diseases in humans. Comparative isolation and identification methods; emphasis on interpretation and significance of laboratory observations. Prerequisite: Micr 201 or equivalent. (Fall, even years)

252 Medical Protozoology (1)

For medical students; open to graduate students. Lecture and laboratory course. Clinical recognition of important protozoal parasites in medical Disease, its pathology, symptomatology, diagnosis, treatment, and prevention. (Fall)

253 Medical Helminthology (1)

For medical students; open to graduate students. Lecture and laboratory course. Clinical recognition of important parasitic worms in medical Disease, its pathology, symptomatology, diagnosis, treatment and prevention. (Fall)

254 Malariology (1)

For medical students; open to graduate students. Lecture and laboratory course. Clinical, laboratory, and epidemiological factors in malarial diseases in humans. Pathogenesis, symptomatology, clinical, and laboratory diagnosis. (Fall)

255 Clinical Virology (1)

Primarily elective course for medical students; open to graduate students. General principles of virology; emphasis on clinical situations. Prerequisite: Micr 201 or equivalent. (Fall)

257 Experimental Immunochemistry (3)

Biochemical and physiochemical characterization of antigens and antibodies. Prerequisite: Bioc 221–22 or equivalent, Micr 229. Laboratory fee for nonmedical students, $20. Limited enrollment. (Spring, even years)

258 Microbial Genetics (2) De Giovanni-Doore

Survey of microbial systems that depict basic concepts of genetic principles. Prerequisite: Micr 211 or equivalent. (Spring)

260 Cellular Immunology (1)

Advanced seminars in cellular aspects of the immune response. Content differs each time course is offered. May be repeated for credit. Prerequisite: Micr 229. (Spring)

277–78 Seminar: Microbiology (1–1)

Required of graduate students. (Academic year)

280 Virology (10)

Selected problems, library assignments, laboratory studies. 8-week elective periods.

281 Biological Basis of Infections (5) Affronti, Re

Selected problems, library assignments, laboratory studies, term paper 8-week elective periods.

282 **Immunology** (5) Kind
Selected problems, library assignments, laboratory studies, term paper. 4-week elective periods.

283 **Bacteriology** (10) Hugh
Selected problems, library assignments, laboratory studies, term paper. 8-week elective periods.

289 **Inflammation, Immunity, and Hypersensitivity** (5) Affronti and Staff
4-week elective periods.

290 **Extramural Microbiology Elective** (arr.)
The department arranges for medical students to spend elective periods in other institutions. Interested students should contact the chairman of the department.

293 **Special Topics in Microbiology** (arr.) Staff
Selected topics in microbiology. May be repeated for credit. (Fall and spring)

295 **Research in Microbiology** (arr.) Staff
Content differs each time the course is offered; may be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3) Staff
(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff
Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff
Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Neurological Surgery

Chairman: H.V. Rizzoli

Professors H.V. Rizzoli, T.H. Milhorat
Clinical Professors H.H. Ammerman, G. Di Chiro, G.J. Hayes, J.M. Van Buren, N.H. Horwitz, C.L. Li, A.K. Ommaya, M.G. Alper
Professorial Lecturers K.M. Earle, V.W. Armbrustmacher, D.O. Carpenter
Associate Professors C.B. Early, D.E. Evans, A.I. Kobrine
Associate Clinical Professors J.P. Murphy, A.N. Martins, A.P. Hustead, F.D. Cooney
Assistant Professor M.K. Hammock

Assistant Clinical Professors J.W. Barrett, C.P.H. Carroll, E. Mannarino, M.
Dennis, S. Koulouris, J. Kushner

Assistant Professorial Lecturer D.A. Ruge

Instructor F.T. Schwartz

Clinical Instructors R.A. Mendelsohn, E.B. Byrd, K. Ghaemi, B. Stopak,
Howe, E.C. Mills, B.J. Ammerman

302 **Clinical Clerkship in Neurosurgery** (2)
2-week elective periods. Univ. Hosp.

380 **Clinical Neurosurgery** (5)
Clinical clerkship in neurosurgical service. Emphasis on neurologic
amination; indications for special neurologic tests, e.g., arteriograms,
moencephalograms; and operative procedures. 4-week elective
Univ. Clinic.

381 **Clinical Neurosurgery** (5)
Participation in all departmental activities: ward rounds, daily
ences, radiographic and pathologic studies, operating room
Emphasis on studies of cerebral circulation. 4-week elective periods.
ter Reed Gen. Hosp.

382 **Clinical Neurosurgery** (5)
Participation in all departmental activities: ward rounds, daily
ences, radiographic and pathologic studies, operating room
week elective periods. Nat'l Naval Med. Center.

383 **Pediatric Neurosurgery** (5)
Participation in all departmental activities: ward rounds, daily
ences, radiographic and pathologic studies, operating room
week elective periods. Children's Hosp.

385 **Clinical Neurosurgery** (5)
Clinical clerkship includes experience with diagnostic procedures:
grams, pneumoencephalograms, myelograms, and assisting in
room; conferences and ward rounds. 4-week elective periods. V.A.

387 **Clinical Neurosurgery** (5)
Participation in all departmental activities, including ward rounds,
conferences, radiographic and pathologic studies, and operating
cedures. 4-week elective periods. Wash. Hosp. Center.

390 **Extramural Neurosurgery Elective** (arr.)
The department arranges for students to spend elective periods in
institutions. Interested students should contact the chairman of the
partment.

Neurology

Chairman: G.F. Molinari

Director of Encephalographic Laboratory: A. Racy

Professors S. O'Reilly, H.H. Hess, D.O. Davis, G.F. Molinari, S.A. Shelburne, Jr., V.H. Askanas *(Research)*

Adjunct Professor D.E. McFarlin

Clinical Professors W.K. Engel, D.S. Buchanan

Professorial Lecturer N.P. Goldstein

Associate Professor A.B. Barnet

Associate Clinical Professors A. Stazio, N. Myrianthopoulos, K.B. Nelson, K. Abraham, C. Ajmone-Marsan, A.J. Levens, D.J. Fishman

Assistant Professors M.M. Platt, A. Racy, R. Laureno, G.M. McCullars *(Research)*, P.F. Teychenne

Assistant Clinical Professors V. Duggins, A.D. Huott, M.M. Davis, W.E. Lightfoote II, F.H. Anderson, R.N. Edelson, M.C. Korengold, M. Osborn, D. Satinsky, H. Silby, E.C. Wilner, V.J. Blazina, N.A. Luban, L.K. Ng, J.F. Grim, G.P. Gabe

Clinical Instructor H.T. Vollero

380 **Clinical Neurology** (5) **Molinari and Staff**

Emphasis on neurologic examination; indications for special neurologic tests, e.g., arteriograms, pneumoencephalograms. 4-week elective periods. Univ. Hosp.

382 **Pediatric Neurology** (5) **Shelburne and Staff**

Clinical clerkship in diagnostic study and care of in-patients and out-patients; conferences and teaching sessions. 4-week elective periods. Children's Hosp.

383 **Clinical Neurology** (5) **Buchanan**

Emphasis on neurological examination and basic sciences, including neuroanatomy, as applied to clinical material. 4-week elective periods. Walter Reed Gen. Hosp.

390 **Extramural Neurology Elective** (arr.)

Students electing clerkships at the University Hospital can spend another elective period in another institution. They should arrange the elective with the other institution and bring a letter of acceptance to the chairman of the department of neurology for approval. The student is responsible for reporting the grade received to the department of neurology, which in turn will submit it to the Associate Dean for Student Affairs and Admissions.

Obstetrics and Gynecology

Chairman: A.B. Weingold

Professors R.H. Barter, J.G. Sites, S.E. Fabro, A.B. Weingold, R. Hertz *(Research)*, L. McGowan, J.D. Schulman, B. Waxman

Professorial Lecturers D.H. Kushner, J.B. Sheffery, R.A. Chez, J.L. Sever

Clinical Professors W.P. McKelway, M.P. Footer, W.H. Cooper, O.I. Dodek, H.L. Kotz, J.W. Pearson, Jr., H.A. Donald, N.J. Price, T.A. Wilson, Friedman, J. Grodin

Associate Professor J.B. Craft, Jr.

Associate Clinical Professors W.T. Lady, D. Walters, P. Soyster, J.C. W L.M. Liverett, M.S. Burnhill, S.M. Belinsky, E.A. Crisp, C.R.A. G M. Rosenbaum, A.A. Becker, R.J. Clark, C.B. Jacobson, J.J. Kuhn, Pugsley, A.I. Robins, S.F. Stewart, Jr., N.M. Tart, E.W. Titus, Jr., Close, S.D. Cooley, S.H. Lipsius, S. Marinoff, D.H. Martin, I.W. Ro H.P. Treichler

Assistant Professors J.L. Marlow, J.W. Larsen, Jr., J.H. Grossman III

Assistant Clinical Professors J.R. Epstein, S.H. Shea, M.W. Sandmeyer, Jr Speck, A.W. Winshel, R.V. Erkenbeck, J. Fogel, W.F. Peterson, C.E send, C.L. Campbell, L.E. Fettig, E.E. Gahres, R.S. Guy, L.C. Radicot Savarese, W.D. Wallace, V.B. Hugh, S.C. Booker, A.J. Heintze, M.A rome, G.M. Kioko, E.G. Koch, S.T. Lee, J.H. Niles, M.J. Roberts, A Van Rooy, J.D. Berryman, R.E. Badwey, B.A. Band, K. Bis, D.R. C A.A. De Moya, T.H. Gresinger, S.R. Johnson, I. Kogan, E.R. Kolvereid Lao, A.M. Lazarus, R.S. Margolis, J. Pan, J. Sacks, C.I. Schneiderman

Assistant Professorial Lecturers J.C. Bulger, A. Kramm

Instructors A. Razi, A.J. Friedman

Clinical Instructors E.E. Cunningham, D.M. Margulies, J.C. Skilling, Perkins, J.E. Anderson, C.D. Lord, R.J. Pierce, J.E. Alarcon, A.A. Ge field, T.A. Cook, Jr., R.C. Rigor-Matory, J.W. Lyles, C.A. Olds, R.J leans, D.C. Cinnamon, W.D. Cooper, F. Hirsch, M.K. Kowalski, R.H. Le A.R. Zwerner

Special Lecturers L. Burnhill, R.T. Greenfield, T.E. Schmitt

***303 Clinical Obstetrics and Gynecology (10)**

Participation in all obstetrical and gynecological clinics, daily departm conferences and ward rounds at University, Fairfax, and Co Hospitals. Manikin demonstrations of mechanism of labor and w types of operative delivery. (8-week periods throughout academic

375 Clinical Obstetrics and Gynecology and Family Planning (5) Weingold, Wa

Participation in office practice of obstetrics and gynecology and planning clinic. 4-week elective periods. Univ. Clinic.

376 Gynecologic Oncology and Cytopathology (5) McG

Participation in all aspects of clinical in-patient and office diagnos treatment of women with gynecologic cancer. Related research elective periods. Univ. Clinic.

377 Fetal Monitoring in Labor (5)

Application of fetal monitoring: accumulation and interpretation Participation in intra-partum study of effects on the fetus of labor pa medication, and types of delivery. 4-week elective periods (min

* Required for medical students.

379 **Infectious Diseases in Pregnancy** (5) Larsen

Study and participation in research in infectious diseases of pregnancy. 4-week elective periods. Univ. Hosp. and Nat'l Inst. of Health.

380 **Clinical Obstetrics and Gynecology** (5) Gahres, Radice

Participation in patient care, clinics, surgery, and delivery. 4-week elective periods. Alexandria Hosp.

383 **Clinical Obstetrics and Gynecology** (5) Footer, Friedman

Participation in office practice of obstetrics and gynecology. 4-week elective periods.

385 **Clinical Gynecology** (5) Gahres

Case assignments, rounds, and conferences, including tumor board, gynecologic pathology, preparation for surgery, attendance at surgery, post-operative care. 4-week elective periods. Wash. Hosp. Center.

386 **Clinical Obstetrics and Gynecology** (5) Cooper, De Moya, Perkins, Kowalski

Participation in office practice of obstetrics and in gynecology. Surgery and delivery. Introduction to sexual therapy and counseling. 4-week elective periods.

387 **Inpatient Obstetrics and Gynecology** (5) Park

Supervised obstetrics and gynecology in a large military hospital; rounds and conferences. 4-week elective periods. Walter Reed Gen. Hosp.

388 **Prenatal Dingnosis of Birth Defects** (5) Fabro and Schulman

Study and participation in research on the chemical aspects of diagnosis and prevention of birth defects. 4-week elective periods. Nat'l Inst. of Environmental Health Science.

389 **Clinical Obstetrics and Gynecology** (5) Fabro

Participation in patient care, rounds, and conferences. 4-week elective periods.

390 **Extramural Obstetrics and Gynecology Elective** (arr.)

The department arranges for students to spend elective periods in other institutions. Interested students should contact the chairman of the department.

Ophthalmology

[illegible]: M.F. Armaly

[illegible] M.F. Armaly

[illegible] M.M. Parks, M.G. Alper, L.E. Zimmerman

Associate Professors B.S. Fine *(Research)*, D.S. Friendly

Associate Clinical Professor L.M. King, Jr.

Assistant Professors R.N. Sunga, J.S. Zacharia, M.J. McCrea *(Research)*, Drum *(Research)*, Y. Jung *(Research)*, G.A. Stern

Assistant Clinical Professors W.J. Romejko, W.P. Chalfant, Jr., R. Day, Lodge, W.B. Glew, K.A. Simon, H.A. Urweider, B.H. Zeavin, H.N. B stein, D.K. Berler, J.N. Goldman, A.L. Fjordbotten, W.S. Gilbert, H.S. W er, D.G. Albert, S.P. Ginsberg, M.H. Zimmerman, F.G. La Piana, Rogell, J.F. O'Neill, D.E. Schwartz, P.T. Gavaris, S.S. Pappas, R.N. Su T. Frey, T.P. Keenan, M.E. Lederman, D.M. Wanicur, P.V. Whitmore

Clinical Instructors R.S. Deitch, H.I. Rodman, G. Liss, H.M. McAllister, Perraut, H.J. Starr, L. Kogan, J.F. Nowell, B. Ehrlich, D.L. Lanter, R. He man, P.A. Dorn, Jr., E.M. Zimmerman, J. Snyder, B.S. Bruner, M.D. Kr W.S.N. Ibrahim, E.M. Titer, D.T. Casey, S. Stoleru, A.E. Eager, Brown III, N.J. Ronsheim

281 **Ophthalmic Pathology I** (1) L. Zimmer
Basic science aspects of diseases of the eye. (Spring)

282 **Ophthalmic Pathology II** (3) L. Zimmer
Diseases of the eye as revealed by gross and microscopic examination. G to eight students. Armed Forces Inst. of Path. (Spring)

284 **Ophthalmic Pathology III** (5) L. Zimmer
Daily participation in an active service limited to pathology of the eye its adnexa. Inflammatory, degenerative, and neoplastic diseases. 4-w elective periods. Armed Forces Inst. of Path.

380 **Clinical Ophthalmology** (5)
Observation and participation in examination, diagnosis, and manage of wide variety of ocular conditions. Emphasis on conducting a ge ophthalmic examination, recognition of abnormal findings, and man ment of common ocular diseases and emergencies. Lectures, rounds, seminars. 4-week elective periods. Wash. Hosp. Center.

381 **Clinical Ophthalmology** (2 or 5) Armaly and S
Observation and participation in examination, diagnosis, and manage of wide variety of ocular conditions in ambulatory patients. Emphasi conducting a general ophthalmic examination, recognition of abnormal f ings, and management of common ocular diseases. Lectures, rounds, seminars. 2- or 4-week elective periods. Burns Bldg.

382 **Clinical Ophthalmology** (2 or 5)
Observation and participation in examination, diagnosis, and manage of wide variety of ocular conditions. Emphasis on conducting a ge ophthalmic examination, recognition of abnormal findings, and man ment of common ocular diseases. Lectures, rounds, and seminars. 2- or week elective periods. Nat'l Naval Med. Center.

390 **Extramural Ophthalmology Elective** (arr.)
Special elective program arranged for selected students at other institutio Interested students should contact the chairman of the department.

Orthopaedic Surgery

Chairman: J.P. Adams

Professors J.P. Adams, H.L. Feffer, F. Leonard *(Research)*, D.W. McKay, R.S. Snell, P.I. Kenmore, R.J. Neviaser
Adjunct Professor V.L. Nickel
Clinical Professors J.S. Neviaser, L.T. Peterson
Associate Professors W.P. Fortune, B.K. Slemmons, S.F. Gunther
Adjunct Associate Professor G.P. Bogumill
Associate Clinical Professors R.L. Dow, B. Genner III, S.S. Haas, T.J. Radley
Assistant Professors H.O. Goller *(Research)*, S.S. Nason, D.B. Parsons *(Research)*, R.J. Lewis, R.B. Reff
Adjunct Assistant Professor H.S. Cattell
Assistant Clinical Professors G.J. Schonholtz, S.H. Eisenberg, K.A. Peterson, L.A. Ottenritter, B.P. Vitek, C.W. McCutchen *(Biomechanics)*, A.I. Dobranski, S. Lavine, M.A. Schultz, U.M. Fortune, P.A. Moskovitz, D.M. Brody
Adjunct Instructor W.J. Sadlack
Clinical Instructors R. Ottenberg, R. Conant, J.W. Harvey, R.M. Ackerman, C.C. Liu, F.R.T. Nelson, T.J. Neviaser, R.L. Gaertner, R. Loeffler, C.C. MacCartee, Jr., J.F. Witte, H.N. Mininberg, B.R. Ain, D.C. Johnson

*302 **Clinical Clerkship in Orthopaedic Surgery** (2) — Lewis, Gunther, and Staff

Basic clinical rotation in orthopaedics for second- and third-year students and fourth-year students who have not had previous orthopaedic rotations. Inpatient, outpatient, and emergency clinical care, with ward and night call responsibilities. Physical diagnosis, x-ray interpretation, trauma, and reconstructive surgery. 2-week elective periods. Univ. Hosp. or Wash. Hosp. Center.

380 **Senior Elective in Orthopaedic Surgery** (5) — Lewis

Students participate in care of orthopaedic inpatients and outpatients, daily rounds, and conferences under the direction of a faculty member at the University Hospital or one of the affiliated hospitals. Prerequisite: Orth 302. 4-week elective periods.

382 **Research in Orthopaedic Surgery** (arr.)

Participation in orthopaedic research to be arranged with various faculty members. Prerequisite: Orth 302.

383 **Sports Medicine** (2 or 5) — Haas

Introduction to athletic injuries, including prevention and management. Prerequisite: Orth 302. Interested students should contact Dr. Haas. 2- or 4-week elective periods.

*Required for medical students.

390 **Extramural Orthopaedic Surgery** (arr.)
The department arranges for students to spend elective periods in
institutions. Prerequisite: Orth 302. Interested students should contac
chairman of the department.

395 **Research in Orthopaedic Surgery** (arr.) Leona
4-, 8-, 12-, or 16-week elective periods. Univ. Hosp.

Otolaryngology

Chairman: J.J. McFarland, Jr.

Clinical Professors W.M. Trible, J.J. McFarland, Jr., R.E. Pumphrey, Jr., R
Webb

Associate Clinical Professors M. Fischer, D.N.F. Fairbanks, M.E. Kru
R.S. Page, Jr., J.A. Sabri, N.L. Barr, Jr., S. Epstein, B.A. Feldman, I.S.
fee, J.L. Levine

Assistant Clinical Professors R.J. Bobys, A. Small

Clinical Instructors H.H.E. Scheidemandel, G.F. Miller, Jr., D. Isaacson, H
Stein, B. Modlin, P.A. Coyne

380 **Otolaryngology** (5)
Care of inpatients and outpatients. Diagnosis, therapy, rounds, and
ferences. 4-week elective periods. Wash. Hosp. Center.

381 **Otolaryngology** (2 or 5) Fairba
Participation in care of outpatients, diagnosis, and therapy; rounds
conferences. 2- or 4-week elective periods. Private office practice.

390 **Extramural Otolaryngology Elective** (arr.)
The department arranges for students to spend elective periods in oto
stitutions. Interested students should contact the chairman of the dep
ment.

395 **Clinical Clerkship** (5)
Inpatient and outpatient rotations; operating room experience. 4-w
elective periods. Nat'l Naval Med. Center.

Pathology

Chairman: H. Sidransky

Professors F.N. Miller, Jr., W. Newman, B.H. Smith, M.J. Matthews, M. We
er (*Laboratory Medicine*), A. Breslow, L.S. Lessin, S. Bloom, C.J. Stahl, J
H. Sidransky, W.L. Marsh

Clinical Professors L.E. Zimmerman *(Ophthalmic Pathology)*, E.B. Helwig *(Dermatologic Pathology)*, N.S. Irey, J.L. Luke *(Forensic Pathology)*, R.S. Melville *(Laboratory Medicine)*, R.E. Palmer, H.W. Casey *(Comparative Pathology)*, C.B. Cook, C.F. Bishop *(Radiation Therapy)*, W.J. Jaffurs, R.A. Malmgren *(Cytology)*, H.A. Schwamm

Professorial Lecturers P.D. Olch *(History of Medicine)*, T. Antonovych, W.C. Roberts *(Cardiology)*, A.S. Rabson

Associate Professors F.S. Jannotta, R.B. Lingeman, N. Saini, D.S. O'Leary *(Laboratory Medicine)*, S.G. Kent, B.C. Zook *(Comparative Pathology)*, Y. Al-Doory *(Laboratory Medicine)*, F.P. Abramson, L. Ortega, J.M.B. Hicks, R.S. Chandra, C.T. Garrett, A.A. Abraham, J.G. Guccion, S.D.S. Hammersberg *(Medical Technology)*, Y.C. Oertel

Adjunct Associate Professor A.F. Gazdar

Associate Clinical Professors F.B. Johnson, H.J. Norris, G.H. Guin, G.G. Brennan, W.F. Enos, D.R. Parkinson, A.S. Lineberger, B.D. Blackbourne *(Forensic Pathology)*, I.D. Godwin, J.W. Howell *(Clinical Chemistry)*, H.R. Schumacher

Assistant Professors J.A. Zeller *(Laboratory Medicine)*, R.H. Patterson, S.P. Kapur, H.P. Hawley, Jr., C.N. Murty *(Research)*, J.M. Orenstein, J.G. Blank

Adjunct Assistant Professor R.F. Garnet, Jr.

Assistant Clinical Professors M.J. Williams, H.H. Berman, L. Riddick *(Forensic Pathology)*, L. Hefter, R. Montali *(Comparative Pathology)*, J.H. Roe, Jr., P. Snow, J.L. Higgins *(Laboratory Medicine)*, M.T. Jessee, C.R. Lissner *(Clinical Microbiology)*, W.P. Monaghan, C.M. Myers, L.L. Pitts II, M. Prodanovich *(Clinical Chemistry)*, L.R. Rubel, G.C. Baker, A.H. Baumhofer, G. Controni, J.L. Hall, P. Lupovich, R. Shamsai

Assistant Professorial Lecturer N.C. Brogdan

Instructor K.H. Fischer *(Allied Health Science)*

Adjunct Instructors K. Rastgar, U. Thorgeirsson

Clinical Instructors C.L. Czerwinski *(Laboratory Medicine)*, H.I. Doerr *(Laboratory Medicine)*, M.F. Pratt *(Laboratory Medicine)*, J.A. Maples, M. Serre, R.E. Struempler, L.F. Turner, R.L. Arroyo, Jr., G.P. Cox, J.W. Jones, S.V. Meade, P.M. Muehl, D.E. Schubert

Special Lecturers L.C. Johnson, R.C. Schoening, K.R. Kahn, D.R. Hunt, Jr., J.F. Schaumleffel, J.L. Shirey, M.J. Diaz, B.J. Green, K.E. Kauffman, H.A. Painter, M.A. Paske, D.D. Sullivan, R.R. Therrien, M.A. Balicki, T.D. Carpenter, D.D. Erickson, T.L. George, D.K. Hanson, K.R. LaBounty, G.A. Lehmer, W.P. Lewandowski, D.G. Holden, J.K. Hougland, M.F. Mosley, T.W. Oldfield, D.M. Parker, N.L. Stanisic, E.D. Vazquez, B.L. Stamp

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Courses numbered 13 through 20 are limited to military personnel in the Medical Laboratory Technique Program.

13 **Hematology** (6) **Staff**

Basic hematologic procedures, diagnosis of abnormalities of cellular elements of blood and bone marrow, studies in blood coagulation, quality control in clinical hematology.

14 **Blood Banking** (6)
Principles of immunohematology, blood donor center techniques, processing techniques, quality control in blood banking.

15 **Clinical Laboratory Rotation** (12)
Instructions in laboratory technique, stressing the application of the and principles of clinical chemistry, clinical microbiology, hematology blood banking in the day-to-day operations of the modern clinical lab tory.

16 **Clinical Chemistry** (5)
Principles and techniques of blood chemistry analyses, including toxico cal analyses for drugs of abuse and environmental poisons.

17 **Urinalysis** (2)
Principles and techniques of urine chemistry and microscopic analysis.

18 **Bacteriology** (6)
Identification of pathogenic micro-organisms by morphologic and cul techniques.

19 **Parasitology** (4)
Identification of human parasites and their life cycles; concentration m ods, staining techniques and media for culture.

20 **Serology** (2)
Principles and techniques of antigen-antibody reaction and immunolo responses.

Courses numbered 100 through 114 are limited to off-campus military per nel in the Medical Technology Program.

100 **Clinical Chemistry Lecture** (4)
Principles and techniques of clinical chemistry, instrumentation, and qu control.

102 **Clinical Chemistry Laboratory** (4)

104 **Clinical Microbiology Lecture** (4)
Principles and techniques of clinical bacteriology, parasitology, and rology.

106 **Clinical Microbiology Laboratory** (4)

108 **Blood Bank Lecture** (4)
Principles and techniques of donor processing, transfusion, and immu hematology.

110 **Blood Bank Laboratory** (3)

112 **Hematology Lecture** (4)
Principles and techniques of general hematology and coagulation.

114 **Hematology Laboratory** (3)

Courses numbered 121 through 128 are open only to students enrolled in the Bachelor of Science degree program with a major in medical technology.

121 **Introduction to Medical Technology** (4) **Staff**
Six-week orientation in laboratory medicine. (Fall)

122 **Clinical Chemistry Lecture** (3) **Hammersberg and Staff**
Ten-week lecture series on routine and special clinical chemistry techniques. (Spring)

123 **Clinical Microbiology Lecture** (2) **Fischer and Staff**
Six-week lecture series on bacteriology, mycology, and virology. (Fall)

124 **Blood Bank Lecture** (1) **Marsh and Staff**
Three-week lecture series on immunohematology and transfusion service. (Spring)

125 **Clinical Hematology Lecture** (2) **Hammersberg and Staff**
Six-week lecture series on routine and special hematology and coagulation. (Fall)

126 **Selected Topics in Laboratory Medicine** (2) **Fischer and Staff**
Three-week lecture and laboratory series on clinical parasitology. Miscellaneous topics in fluid analysis. (Spring)

127 **Clinical Laboratory Rotation** (7) **Staff**
Sixteen-week rotation in the University Hospital laboratories. (Fall)

128 **Clinical Laboratory Rotation** (9) **Staff**
Twenty-five-week rotation in University Hospital clinical laboratories. (Spring)

129 **Pathology for New Health Practitioners** (3) **Staff**
Lecture course with optional laboratory. Basic pathologic concepts and infectious diseases; language of pathology; fundamental disease processes. Emphasis on pathogenesis and dynamics of disease. Causation, evolution, and morphology of pathologic changes in the principal diseases of each organ system presented in coordination with clinical lectures in Idis 301. (Fall and spring)

152 **Introduction to Basic Laboratory Medicine** (3) **Hammersberg**
Theory, performance, and interpretation of some important routine clinical laboratory tests performed in a physician's office, such as complete blood counts with differentials, staining and reading smears, urinalysis and urine cultures, routine chemistries (sugar, BUN, electrolytes), microbiological culture and staining techniques, and organism identification. Lectures, demonstrations, audiovisuals. Supervised and evaluated performance of these tests in a laboratory setting. Prerequisite: Path 129. (Summer)

*201 **Pathology** (8) **Staff**
A year course; required for second-year medical students. General introduction to concepts of disease. Pathology of organ systems; correlation

*Required course for medical students.

with symptoms and physical signs. Gross and microscopic study of dis
tissues. Case studies.

203–4 **Pathology** (4–4)
For graduate students. General introduction to concepts of disease. Pa
ogy of organ systems; correlation with symptoms and physical signs.
and microscopic study of diseased tissues. Case studies. Limited e
ment. Prerequisite to Path 204: Path 203. (Academic year)

*205 **Comparative Pathology I** (3)
Study of disease in vertebrates, comparison with disease in hu
Mechanisms by which various agents provoke illness; body defensive
tions. Illustration of common diseases of various species, including ma
from captive wild animals. Recommended prerequisite: courses in a
my, histology, and physiology. (Fall)

*210 **Comparative Pathology Laboratory** (2)
Participation in an autopsy service involving captive wild ani
Comparison of diseases in various animal species with those in hu
Limited to four students. Path. Lab., Nat'l Zoological Park. (Fa

*215 **Perinatal Pathology Laboratory** (2) (Fa
Special assignments for dissection and study. Univ. Hosp.
hours per week)

217 **Gross Autopsy Pathology** (1) Blackbourne, M
Review of current necropsy cases. Interpretation of clinical symptoms
signs and radiographs on the basis of gross changes in organs.
Hosp. (Spring)

Al-D

220 **Medical Mycology** (2)
(Formerly two or four credits)
Study of pathogenic fungi, mycotic diseases, and their clinical asp
Emphasis on handling specimens, diagnosis, and identification of etio
agents. (Fall)

Al-D

221 **Medical Mycology Laboratory** (1)
Laboratory complement to Path 220. Prerequisite or concurrent reg
tion: Path 220. Laboratory fee, $20. (Fall)

Al-D

222 **Opportunistic Mycoses** (2)
Study of the opportunistic fungal infections and their serological, cli
and therapeutic aspects. Emphasis on identification of fungi and ev
tion of laboratory findings. (Spring)

Blackbourne, Ri

252 **Forensic Pathology and Medical Jurisprudence** (1)
Somatic death, coroner and medical examiner systems, pathology of p
cal and chemical injuries, medical licensure; the physician-patient rel
ship and professional liability are discussed. (Spring)

* Open to limited number of graduate students, with permission.

253 **Medicine in Shakespeare** (1) — Miller

Seminars with student and staff presentations covering the medically significant plays of William Shakespeare. (Spring)

254 **Medicine in Literature** (1) — Miller

Series of discussions with student and staff presentations covering novels, drama, nonfiction, and poetry of medical significance. (Fall)

260 **Obstetric and Gynecologic Pathology** (1) — Jaffurs

Organ changes in normal and abnormal pregnancy, including both the mother and the fetus. Diseases of female genital system. (Spring)

261 **Seminar in Experimental Pathology** (1) — Sidransky

Current topics in research in experimental pathology. (Spring)

266 **Comparative Pathology Elective** (1) — Zook

Participation in an autopsy service involving captive wild animals. Comparison of diseases in various animal species with those in humans. Limited to four students. Path. Lab., Nat'l Zoological Park. (Spring)

272–73 **Seminars in Mycology** (1–1) — Al-Doory

Conferences and discussions on current topics and latest developments in medical mycology. Open to graduate students and residents. May be repeated for credit. (Fall and spring)

275 **Research in Mycology** (2) — Al-Doory

Participation in experimental studies in mycotic diseases. Research in laboratory or community medicine related to mycology. May be repeated for credit. (Fall and spring)

*277 **Anatomic Pathology Clerkship I** (arr.) — Staff

Gross human anatomy and pathology. Students spend up to 24 full-time weeks on the necropsy and surgical pathology services, receiving one semester hour of credit for each four-week period. Prerequisite: Anat 201 or equivalent. Univ. and V.A. Hosps.

280 **Surgical Pathology I** (2) — Newman, Palmer, Schwamm

Surgical pathology service at participating hospitals. Examining specimens from current surgical cases, correlating with clinical manifestations. Univ., Alexandria, and Andrews AFB Hosps. (Spring—3 hours per week)

*281 **Anatomic Pathology Clerkship II** (arr.) — Staff

Gross and microscopic human pathology. Students spend up to 24 full-time weeks, or the equivalent part-time, on the necropsy and surgical pathology services, receiving one semester hour of credit for each four-week full-time period. Prerequisite: Path 201 or equivalent. Univ. and V.A. Hosps. (Spring)

*283 **Anatomic Pathology Clerkship III** (arr.) — Staff

Necropsy and surgical pathology service. Graduate students receive five semester hours of credit for each four-week period and may receive up to 30

* Open to limited number of graduate students, with permission.

semester hours of credit for six months full time. Medical students
five semester hours of credit for each four-week elective
Prerequisite: Path 201 or 203–4. (Medical students: 4-week electiv
ods. Graduate students: fall or spring)

284 **Ophthalmic Pathology** (5)

Daily participation in service limited to pathology of the eye and its a
4-week elective periods. Armed Forces Inst. of Path.

286 **Perinatal Pathology** (5)

Participation in perinatal (fetal and newborn) necropsies. Study of s
teaching cases. Examination of selected placentas for disease. 4-week
tive periods. Univ. Hosp.

287 **Immunohematology and Blood Banking** (5)

Preparation and use of blood and blood products in surgery and in
diseases studied from laboratory and clinical viewpoints. Emphasis on
agement of acute clinical situations. 4-week elective periods. Univ

288 **Clinical Pharmacology and Toxicology** (5)

Correlations of therapeutic drug levels in hospitalized patients and o
tients with their clinical status. Evaluation of rational dosage sched
Development and application of clinical laboratory methods for deter
tion of drug levels. 4-week elective periods.

289 **Clinical and Anatomical Pathology** (5)

Daily studies of surgical and necropsy pathology, including forensic pa
ogy; clinical pathology projects, including hematology, isotopology, ba
ology. 4-week elective periods. Fairfax Hosp.

290 **Extramural Pathology Elective** (arr.)

The department arranges for medical students to spend elective perio
other institutions. Interested students should contact the chairman o
department.

291 **Clinical and Anatomical Pathology** (5)

Opportunity to explore in depth a topic selected from the field of patho
library study. 4-week elective periods. V.A. Hosp.

293 **Clinical and Anatomical Pathology** (5)

Participation in departmental activities, including clinical chemistry,
bank, microbiology, and hematology; surgical pathology; autopsy pa
gy, including medico-legal autopsies. 4-week elective periods. Ale
Hosp.

294 **Forensic Pathology** (5)

Participation in the activities of the office of the chief medical examin
the District of Columbia: observation of scene investigation, particip
in medico-legal autopsies, attendance at court trials, etc. 4-week ele
periods.

*295 **Comparative Pathology II** (arr.) Zook, Casey, Mo

Participation in veterinary pathology service, including wild and do

* Open to limited number of graduate students, with permission.

animals. Graduate students receive five semester hours of credit for each four-week period and may receive up to 30 semester hours of credit for six months full time. Medical students receive five semester hours of credit for each four-week elective period. Prerequisite: Path 201 or 203–4, and 283. (Medical students: 4-week elective periods. Path. Lab., Nat'l Zoological Park, and Armed Forces Inst. of Path. Graduate students: fall or spring)

296 **Surgical Pathology II** (5) Newman

Evaluation of surgical specimens and correlation with clinical status of patient; description of gross and microscopic findings on assigned cases. 4-week elective periods. Univ. Hosp.

297 **Dermal Pathology** (5) Helwig

Microscopic conferences, review of current material and study sets. 4-week elective periods. Armed Forces Inst. of Path.

298 **Necropsy Pathology** (5) Staff

Organ changes in disease, gross and microscopic examinations, preparation of protocols. 4-week elective periods. Univ. Hosp.

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

398 **Advanced Reading and Research** (arr.) Staff

Limited to students preparing for the Doctor of Philosophy general examination. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Pharmacology

Chairman: H.G. Mandel

Professors H.G. Mandel, V.H. Cohn, Jr., P. Mazel, R. Hertz *(Research)*, S.E. Fabro *(Research)*, J.A. Straw
Professorial Lecturers F.E. Hahn, J. Axelrod, E. Costa, N.H. Neff
Associate Professors P. Klubes, F.P. Abramson
Assistant Professors A.M. Suria, R.J. Anderson
Special Lecturer J.R. Silvio *(Drug Abuse)*

21–22 **Chemistry and Physics of Anesthesia** (3–3) Mazel and Staff

For students in nursing anesthesia. Fundamental concepts of physics; general chemistry, organic chemistry, biochemistry, and their application to medicine and anesthesiology, including chemistry of respiration, acid-base balance, clinical biochemistry and enzymology, hormones, radioisotopes, electronics, physiochemical properties of anesthetic agents, and other related topics. (Academic year)

110–11 **Pharmacological Basis of Anesthesia** (4–4) Mazel and
For students in nursing anesthesia. Fundamental principles of pharma
gy; drugs affecting the autonomic nervous system, central nervous sy
and cardiovascular system; fundamentals of inhalation anesthesia; aux
drugs used in anesthesiology; endocrines, cancer chemotherapy;
topics. (Academic year)

114 **Drugs and the Consumer** (3) Cohn and
General concepts concerning drug action in the body. Mechanism of
of some specific prescription and nonprescription drugs, including co
ceptives; tranquilizers and sleep-inducing drugs; hayfever, headache
cold remedies; analgesics; antibiotics; vitamins. Issues related to dev
ment and marketing of drugs, drug safety, drug advertising, generic v
trade-name drugs, drug use in sports, drug use during pregnancy, sm
and health. No science prerequisite required. Limited enrollm
(Fall)

115 **Nonmedical Use of Licit and Illicit Drugs** (3) Cohn and
(Formerly Drug Abuse Education)
Psychological and sociological bases of recreational and other nonme
use of drugs, pharmacological and toxicological aspects of drug actio
both the brain and peripheral organ systems, legal and societal imp
tions of and reactions to the nonmedical use of drugs, prevention
treatment of drug dependence. Lectures and discussions on alcohol,
cotics, central nervous system stimulants and depressants, marijuana,
lucinogenic and psychedelic drugs. (Spring)

120 **Readings in Pharmacology for Anesthesia** (arr.) Mazel and
For students in nursing anesthesia. Assigned reading in anesthesia an
lated areas; preparation of reports.

130 **Seminar: Accessory Drugs in Anesthesia** (2) Mazel and
For students in nursing anesthesia. Presentation of the pharmacology
pharmacodynamics of accessory anesthetic drugs; emphasis on those
not covered in Phar 110–11.

158 **Pharmacology for New Health Practitioners** (2) Klubes and
For students in allied health programs. Basic pharmacology course.
preparations, the basis of their therapeutic and toxic actions and their
in the body. Prerequisite: HCS 110, 112, Phyl 111.

191 **Respiratory Care** (3) Mazel and
Same as Anes 191. For students in nursing anesthesia. Advanced
niques for care of patients requiring total respiratory support.

195 **Electronics for Medical Personnel** (2) Mazel and
Same as Anes 195. For students in nursing anesthesia. Introduction to
damental principles used in electronic instrumentation for monitoring
tient status in operating room and intensive care unit. Signal conditio
processing and display techniques, special purpose instruments, safety
ards.

201–202 **Pharmacology** (6–2) Straw and
(Formerly Phar 201, eight credits)
Required for second-year medical students. Lectures, laboratory,

ences on interaction of drugs and biological systems as a basis for rational therapy of disease. Prerequisite: Bioc 201, Phyl 201, 212.

203 **Fundamental Principles of Pharmacology** (3) Cohn and Staff

Basic principles of pharmacology, including drug-receptor interactions, structure activity relationships, pharmacokinetics, membrane phenomena, cellular control mechanisms, drug toxicity. Admission by permission of instructor. (Fall)

205–6 **Pharmacology** (6–2) Cohn and Staff

For graduate students. Lectures, laboratory, conferences on interaction of drugs and biological systems as a basis for rational therapy of disease. Pharmacodynamics, mechanisms of action, physiological disposition, toxicity, and relative evaluation of drugs. Prerequisite to Phar 205: Bioc 221–22, Phar 203, Phyl 201, 212, or approval of department. Prerequisite to Phar 206: Phar 205. (Fall)

215 **Adolescent Drug Abuse** (3) Cohn and Staff

Not open to medical students. Offered off campus through the College of General Studies. Primarily for teachers, counselors, and school administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, marijuana, hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse. (Fall and spring)

254 **Frontiers in Pharmacology** (1) Mazel and Staff

For medical and graduate students. Recent advances and fields of research in pharmacology. Presentations by laboratory scientists from neighboring institutions. (Spring)

256 **Molecular Pharmacology** (2) Hahn

For medical and graduate students. Current theory on action of drugs, especially chemotherapeutic agents, at molecular level. Effect of drugs on biosynthetic processes of the cell with respect to DNA, messenger RNA, transfer RNA, ribosomes, protein, cell wall, and intermediary metabolites. Factors which alter action of drugs, such as drug interactions and resistance. (Spring)

258 **Cancer Chemotherapy** (1) Mandel and Staff

For medical and graduate students. Mechanisms by which drugs inhibit the growth of tumor cells. (Spring, even years)

260 **Endocrine Pharmacology** (1) Hertz and Staff

For medical and graduate students. Lectures and seminars on recent advances in the pharmacology and mechanism of action of various hormones. (Spring, odd years)

267 **Pharmacological Research** (3) Staff

For graduate students. Research with staff members. May be repeated once for credit toward a Master of Science degree. (Fall and spring)

269 **Pharmacology Seminar** (1) Mazel and Staff

For graduate students. Recent advances in pharmacology. Content differs each time the course is offered; may be repeated once for credit. (Fall and spring)

272 **Physiological Disposition of Drugs** (3)
For graduate students. Fate of drugs in biological tissue. Absorption, tribution, chemical alteration, excretion of drugs; physical, chemical, biological factors affecting these processes. Prerequisite: Phar 201 or 2 or permission of instructor. (Spring, even years)

275–76 **Advanced Topics in Pharmacology I–II** (1–1) Anderson and
Lectures and seminars on advances in mechanisms of drug action, pha cology of new drugs, theoretical aspects of pharmacology, labor techniques. (Academic year 1979–80 and alternate years)

277–78 **Advanced Topics in Pharmacology III–IV** (1–1) Anderson
Continuation of Phar 275–76. (Academic year 1978–79 and alte years)

279 **Special Topics in Pharmacology** (arr.)
Selected aspects of drug action. Content differs each time the course fered; may be repeated once for credit. (Fall and spring)

280 **Neuropharmacology** (2) Suria and
Fundamental principles of neuropharmacology. Electrophysiological biochemical techniques in studying neuropharmacology. Neurotransmi and their pathways in central nervous system. Drug effects on various rotransmitter pathways. Biochemical basis of mental disease. Prerequi Pharm 205–6 or equivalent. (Spring, odd years)

285 **Readings in Pharmacology** (arr.)
For medical students. Assigned reading and preparation of re (Fall and spring)

286 **Research in Pharmacology** (arr.)
For medical students. Participation in experimental studies in pharmac gy, particularly endocrinology, cancer chemotherapy, or drug metabol (Fall and spring)

287 **Readings in Drug Abuse Literature** (arr.) Cohn, Kl
Both professional and nonprofessional literature in the general area of dependence. Informal monthly luncheon discussions. (Spring)

295 **Reading and Research** (arr.)
Independent study for students preparing for the Master of Science de May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)
(Fall and spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Philosophy general exa May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Philosophy candidates. May be repeated for cr (Fall and spring)

Physiology

Chairman: R.A. Kenney

Professors C.S. Tidball, R.A. Kenney, M.E. Tidball, M.M. Cassidy, M.J. Jackson

Professorial Lecturer D.O. Carpenter

Associate Professors R.A. Lavine, D.W. Watkins

Assistant Professor M.J. McCrea *(Research)*

Assistant Professorial Lecturers I.P. Weiss, D. Forman, M. Katzper, K.R. Spring

Departmental prerequisite: Phyl 201 or equivalent is prerequisite to all courses in physiology numbered above 201.

111 **Physiology for New Health Practitioners** (3) M.E. Tidball

For students in physician's assistant, nurse practitioner, and nursing anesthesia programs. Lecture, film, and demonstration. Function and process of the human body covering the major organ systems.

191 **Selected Topics in Human Structure and Function** (3) Kenney

Lecture (2 hours), laboratory (1 hour). Structural and functional basis of physiology. Undergraduate course, required for graduate students who have not had Anat 201 or equivalent; students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent and consent of instructor. Open to Columbian College students with approval of advisor. (Fall)

*201 **Physiology** (8) Staff

Lecture (8 hours), laboratory (2 hours), conference (1 hour). Cellular, organ system, and applied human physiology. Prerequisite for graduate students: Anat 201 or Phyl 191, or equivalent; Bioc 201 or 221–22 (Bioc 222 may be taken concurrently); or consent of chairman of department. Open to consortium students only with permission of department chairman. (Spring)

205 **Cell Biophysics** (2) Jackson

Introductory survey of the mechanisms for interconversion and utilization of energy in animal cells. Required for graduate students intending to take Phyl 201. Students may receive graduate credit on completion of additional work as prescribed by the instructor. Prerequisite: BiSc 11–12 or equivalent, and consent of instructor. Open to students in Columbian College with approval of advisor. (Fall)

212 **Neurobiology** (3) Staff

For graduate students. Same as Anat 212 and Idis 212. Integrated survey of the structure and function of the human nervous system; lecture, clinical demonstration, and laboratory. Laboratory fee, $25.

* Required for medical students, open to graduate students.

221 **Seminar** (1)

Staff and student presentations from literature. Present work discusse perimental design and scientific deduction evaluated. Topics to b nounced. Content differs each time the course is offered; may be re for credit. (Fall and spring)

223–24 **Biomedical Instrumentation** (4–4)

Same as Bioc 225–26 and Micr 240–41. Comprehensive study of retical and practical application of biomedical instrumentation to the ration, identification, and quantification of materials of interest t medical and forensic scientists. Labratory fee, $50. (Academic

251 **History of Medicine** (1)

Survey of the great contributors to physiology and medicine in the text of the times in which they lived and worked. (Fall)

253 **Physiology of Fluid Balance and Hydrogen Ion Regulation** (2)

Discussion of principles of fluid and acid-base balance and the applic of these principles to specific situations. (Fall)

260 **Membrane Physiology** (1)

Systematic review of the factors which determine the movements of and solutes across simple cellular membranes and complex epithelial riers in animal tissues. Prerequisite: Phyl 190 or permission of in tor. (Fall)

261 **Gastrointestinal Physiology** (1)

Weekly seminar; role of basic sciences in gastroenterology; intra- extra-mural speakers. An approved paper required for two semester h of credit. May be repeated for credit. (Fall and spring)

262 **Topics in Cardiovascular Physiology** (2)

Survey, at an advanced level, of aspects of cardiovascular physiology cially as interrelated with the respiratory and renal systems.

269 **Topics in Neurophysiology and Psychophysiology** (2)

Selected topics in contemporary neurophysiology, including methods of collection and analysis, control mechanisms involved in movement and havior and sensory processing. Admission by permission of instruc (Fall)

270 **Computer Utilization in Physiology and Medicine** (3)

Lecture one hour per week, practical experience at student's conveni Orientation to digital and analog mini-computers. Programming in s languages. Experience with one or more computers. No previous comp experience necessary. (Fall)

271 **Computer Simulation of Physiological Processes** (3)

Programming of physiological simulation will be learned by writing series of simulations of increasing complexity. Prerequisite: Phyl 270 equivalent, or permission of instructor.

272 **Reading and Research in Simulation of Physiological Processes** (3) C. Tidball

Readings and discussion on physiological simulations and their evaluation. Prerequisite: Phyl 271 or equilavent, or permission of instructor.

282 **Experimental Physiology** (5) Staff

Participation in an ongoing research program in the department. Programs are currently available in the areas of membrane physiology, intestinal transport, neurophysiology, and cardiovascular physiology. 4-week elective periods.

284 **Advanced Physiology** (5) Staff

Guided study or laboratory experience at an advanced level in a subfield of physiology. Prior arrangements should be made with the individual faculty member. 4-week elective periods.

290 **Extramural Physiology Elective** (arr.)

The department arranges for medical students to spend elective periods at other institutions. Interested students should contact the chairman of the department.

295 **Research** (arr.) Staff

By special arrangement with individual staff members. Approximately four clock hours in the laboratory for each semester hour of credit. (Fall and spring)

298 **Comprehensive Physiology** (arr.) Staff

Guided review of selected areas of physiology appropriate to the student's graduate program. This course satisfies the requirements for the Master's Comprehensive Examination, the Field Examination for doctoral students minoring in physiology, and Part I of the Cumulative General Examination. Prerequisite or concurrent registration: Phyl 221. (Fall)

299–300 **Thesis Research** (3–3) Staff

(Fall and spring)

396 **Advanced Reading and Research** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Tutorial literature survey of a subfield of physiology and of pertinent areas of the candidate's minor field. This course satisfies the requirement for Part II of the Cumulative General Examination in physiology. (Fall and spring)

397 **Development of Dissertation Problem** (2) Staff

Limited to students preparing for the Doctor of Philosophy general examination. Preparation for written and oral presentation of dissertation problem. This course satisfies the requirement for Part III of the Cumulative General Examination in physiology. (Fall and spring)

399 **Dissertation Research** (arr.) Staff

Limited to Doctor of Philosophy candidates. May be repeated for credit. (Fall and spring)

Psychiatry and Behavioral Sciences

Chairman: J. Wiener

Professors L. Yochelson, J.E. Rankin, T.G. Webster, D. Reiss, J. Wiener, Noshpitz, S. Perlin

Adjunct Professors M. Levine, R.B. McKay

Clinical Professors T.D. Noble, S. Berman, M. Kleinerman, M.deG. [illegible], L. Ferber, P. Gray, P. Chodoff, H.A. Meyersburg, F.N. Waldrop, H. W[illegible] *(Experimental Psychology)*, H. Resnik, W. Stark, B. Brown, H.H. Wo[illegible], Cytryn, E.I. Kushner, J. Kafka, M. Meltzer, J. Spurlock, M. Katz, Bever, S.L. Baker, Jr., G.R. Ticho, R.L. Shapiro, E.A. Hargrove, B. Lennan, R.E. Rieger, R.N. Butler, R.M. Coleman, H.P. Laughlin, Robinson, J.G. Rubin, M.F. Shore

Professorial Lecturer H.D. Lederer

Associate Professors J.J. McMillan *(Psychology)*, W.H. Scott, R. Kurz, Frankel, J.H. Egan, P.J. Steinglass

Adjunct Associate Professor F.K. Millican

Associate Professorial Lecturers G.E. Morris *(Allied Health Science)*, P. Ha[illegible]

Associate Clinical Professors I.H. Kaiser, D. Eden, S.I. Szara *(Psychopha[illegible] cology)*, E.S. Fleming, R.M. Greenberg, J.L. Sheridan, J. Durell, B. O[illegible] er, H.B. Lehrman, I.H. Marill, T.D. Reynolds *(Experimental Psychi[illegible]* P.S. Weisberg, C.J. Frederick *(Medical Psychology)*, A.S. Abraham, Straight, J.J. Francis, A. D'Agnostino, W.J. Stockton, R. Peele, J.T. Q[illegible] baum, D.D. Cowell, M.R. Haas, R. Dupont, Jr., P.F. Wohlford, J.H [illegible] trez, B.L. Burris, C.C.H. Cullander, D.L. Tippett, A. Ward, Jr. *(Soci[illegible]* H.S. Winston, J.E. Meeks, J. Smith, M.J. Stern, G. Scarcella, J.B. Er[illegible] J. Zinner, C.B. Robinowitz, F.M. Ochberg, S.J. Wolin, L.W. Allen, Hamburg, M.T. Advani, B.B. Doyle, M. Engel, C. Goldberg *(Psycho[illegible]* S. Gordon, Jr., S. Greenspan, F.G. Hilkert, H.A. Hoffman, K.L. Ka[illegible] J.J. Katzow, E.J. Lieberman, S.H. Lipsius, T.M. Mackenzie, D.H. McN[illegible] Jr., I.D. Milowe, D.Y. Patterson, R.A. Rogers, A.E. Slaby, G.A. Tripp, Kehne

Assistant Professors D.I. Davis, K. Ravenscroft, Jr., L. Sank, C.B. Fern[illegible] M. Hertzman, I.S. Baron-Starke, L.A.M. Bennett *(Research)*, R.A. K[illegible] E.M. Plionis *(Research)*, S.M. Sotsky, M.E.P. Oliveri *(Research—Psychol[illegible]* D.C.T. Choate *(Social Work)*

Adjunct Assistant Professors A.T. Billett *(Social Work)*, M.M. Reynolds *(S[illegible] Work)*, R.S. Richmond *(Social Work)*

Assistant Clinical Professors S.S. Tenenblatt, W.C. Johnson, R.A. Fran[illegible] Schaffer, W.H. Young, Jr., J.H. Bouma, D.A. Lanham, S. Mourat, H[illegible] Greenberg, G. Cotts, M.L. Garrett, J.M. Post, R.A. McElroy, F.B. Th[illegible] *(Social Work)*, B. Crowley, B.P. McKaig, J.A. Schoettler, S. Weis[illegible] M.S. Glatt, A.E. Marans, P.B. Holly, L.A. Cove, J.L. Evans, B. Ps[illegible] M.J. Chalick, G. Schaeffer, R.T. Lewit, A.M. Messore, W.F. Weber, [illegible] Wadeson, Jr., E. Black, D.H. Fram, A.B. Zients, D. Grodsky, D.D. Fo[illegible] E.A. Sorrentino, E. Taylor, B. Kraff, M.R. Goldberger, D.J. Gardner, [illegible]

Gross, J.L. Wellhouse, J.R.S. Malkin, R.A. Ratner, B. Landau, A.H. Stein, L.R. Conte, P.A. Lange, N.A. Schweig, S.L. Billet, J.C. Chatel, K.P. Gorelick, R. Hirschfeld, H. Steinberg, R.C. Bristol, R.M. Costell, L.D. Levi, S.L. Goodman, G.D. Legler, S.A. Savitz, W.F. Thompson, M. Giller, J.A.F. Chused, J.R. Sealy, S.K. Kolansky, R.A. Nover, S. Rosenblum, D.E. Scharff, J.L. Read, S.R. Pieczenik, D. Charney, P.E. Chanel, D.T. Mosher, A. Olaciregui, M. Boverman, D.I. Joseph, L.E. Kruez, D.G. Lipman, N.L. Wilson, G.H. Miller, H.W. Rice, J.P. Waletzky, L. Turner, K. Kessler, J. Barber, D.A. Dansak, R.C. Eisner, C. Frank, J.A. Frank, Jr., J.H. Herzberg, W.B. Mendelson, R.R. Palmer, R. Teitel, H.R. West, S.L. Aledort, R.G. Ammerman, B.S. Arons, W.E. Barquist, E.C. Bergman, L.A. Brain, C.V.A. Cabrera, E.W. Cotlove, R.B. Gerber, B.C. Gorman, S.A. Hassan, B.E.S. Lawrence, H.M. Meagher, B.R. Milowe, P.F. Namrow, A.C. Nielsen III, R.V. Palombo, H. Plotsky, J.D. Robinson, A.R. Sager, A.J. Salerian, B.M. Smoller, E. Sorel, F. Strassburger, P.J. Santora

Assistant Professorial Lecturers A.S. Fonaroff, A. Zappala, C.T. Dunn

Instructors J.L. Gaiter, A.B. Livingood, L.A. Vitulano

Adjunct Instructors S.S. Lynn, E.K. Wolf *(Social Work)*, N.B. Delston, G.K. Palys

Clinical Instructors S.E. Samenow *(Psychology)*, K.L. Owens *(Social Work)*, A.H. Reese *(Social Work)*, C.T. Chastek, I.M. Chatoor-Koch, M.M. Clancy, M.W. Gross, R.W. Keisling, C.I. Margolis, N. Sacirbey, S.W. Skoler, C.J. Weyland, E.J. Balsley, R.J. Garson, M.M. Herenda, K. Huang, F.L. Kolodner, J.E. Lincoln, J.R. Maloney, P.B. Polatin, D. Pope, V.I. Reus, A.B. Salzman, G.W. Schwarcz, M.M. Schwartz, C. Schwarzbeck, M.L. Usher

Special Lecturers J. Hoffman, J.B. Chassan *(Biostatistics)*, R.L. Siegel

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All clinical courses are five credit hours per four-week period.

250 Individual Student Preceptorship (1) — Wiener and Staff

First- and second-year medical students can arrange individual preceptorships other than departmental electives listed below with the permission of the chairman of the department.

***252 Psychological and Social Factors of Medical Practice** (1) — Reiss and Staff

Basic principles of the doctor-patient relationship. Analysis of psychological growth and development, family process, and the personality of the physician as they influence everyday medical practice.

***301 Psychopathology and Conceptual Models** (3) — Dunn and Staff

(Formerly Introduction to Clinical Problem Solving)

For second-year medical students. Mental mechanisms, psychopathology, introduction to psychiatric syndromes, clinical interviewing, behavioral sciences in clinical medicine. (Fall)

***302 Clinical Clerkship** (10) — Webster, Giller, Hoffman, Ryder and Staff

Supervised examination, diagnosis, out-patient and in-patient treatment at

* Required for medical students.

University, St. Elizabeths, Childrens, and Washington V.A. Ho
and Psychiatric Institute. Case conferences, seminars on psychiatric
ral, "psychiatric" drugs, community resources. Psychiatry in genera
tice stressed. (Fall and spring)

353 **Basic Psychoanalytic Concepts; Clinical Illustrations** (1)

Basic psychoanalytic concepts such as dreams, transference phenome
the various components of personality structure. Participation in
sions focusing on psychoanalytic issues and the relevance of such c
to the practice of medicine in general. For first- or second-year
students. Wash. Psychoanalytic Soc. Bldg. (Spring—eight tw
sessions)

365-66 **Seminar: Advanced Family Diagnosis and Psychotherapy** (3–3)

*(Formerly Seminar: Clinical Introduction to Family Diagnosis
Therapy)*

Combined didactic and clinical exercises designed to offer in-depth
standing of family therapy theory and technique. Open to postgr
physicians and advanced graduate students in the behavioral sciences.

381 **Clinical Psychiatry (5)** Webster, Hertzman, S
Frankel, Wiener,

(Formerly Psychiatric Research: Human Development)

Student performs as acting intern on one or more of the psychiatry
ices of the Medical Center: inpatient and emergency (Hertzman),
tient (Sotsky), and consultation-liaison (Frankel). Assignments are
on student preference within limits of feasibility for the elective
involved. 4-week elective periods.

383 **Psychological Aspects of Medical Illness and Care** (10 or 15)

(Formerly Psychiatric Day Care)

Student participates in an individualized program on the consultation
son service, with emphasis on psychosocial factors affecting the
manifestations, and treatment of medical illness. Involvement in con
tion process, conferences, liaison meetings, individual supervision of
cal work, and related readings. 8- or 12-week elective periods.

384 **Outpatient Psychiatry** (10) Sotsky, Stein

Student participates as acting intern in multidisciplinary outpatient
team. Diagnostic assessment, crisis intervention, pharmacotherapy; sup
sion of clinical work and readings in field; participation in clinical
conferences, assessment conferences, and relevant resident seminars
week elective periods.

385 **Psychosocial Aspects of Heart Disease (5)**

(Formerly Schizophrenic Reactions)

Student participates under direct supervision of faculty in individual
group work with post-myocardial infarction patients and their fa
during hospitalization and the subsequent follow-up period. Study of
chological, social, and physiological aspects of heart disease, inclu
exercise and rehabilitation. Participation in related seminars, psychia
medicine liaison activities, and related readings and discussion. 4-w
elective periods.

386 **Substance Abuse** (5) — Davis, Advani
(Formerly Psychiatric Research)
Student participates in individualized program in alcohol and/or other drug abuse. Supervised clinical work with patients and families, research experience, and related readings. Participation in seminars and team activities. 4-week elective periods.

387 **Family Research** (10) — Reiss and Staff
(Formerly Clinical Psychiatry)
Student participates in family research and performs own project with individual supervision. Related readings. 8-week elective periods.

388 **Child and Adolescent Psychiatry** (5) — Noshpitz, Wiener, Feinstein, Ravenscroft, King
Student performs as acting intern in child psychiatry. A specialized elective in consultation with pediatric wards (Ravenscroft), outpatient evaluation and treatment of selected child patients and their families (Feinstein), and/or inpatient child and adolescent services (King). Eight weeks required for specialized experience in all three areas. Individualized program by arrangement. Assignments based on student's preference and prior experience, within limits of feasibility for elective period involved. 4-week elective periods. Children's Hosp.

390 **Extramural Psychiatry Elective** (5) — Webster
The department may arrange for students to spend elective periods at other institutions. 4-week elective periods.

395 **Psychiatric Day Care: Adults, Adolescents** (5) — Hoffman, Advani, Quattlebaum
(Formerly Substance Abuse)
Student participates in the evaluation of patients referred for day care and in the various activities and programs in the day care centers. Research pertaining to the day care center in its role in the treatment of psychiatric patients. 4-week elective periods. Psychiatric Institute.

396 **Psychiatry on the Gerontology Service** (5) — Lange, Kleh, Hoffman
(Formerly Alcoholism: Inpatient Treatment)
Student participates in supervised clinical work on a short-term, multi-disciplinary treatment center for gerontological patients. The focus is on comprehensive evaluations, working with the family, and effective discharge planning. 4-week elective periods. Psychiatric Institute.

397 **Schizophrenic Reactions** (5) — Ehlers, Bullard*
(Formerly Family Medicine)
Student observes and participates in the treatment and management of patients, and in staff meetings. Individual supervision, case write-ups, and selected readings. 4-week elective periods. Chestnut Lodge, Rockville, Md.

398 **Clinical Psychiatry** (5) — Giller and Staff
(Formerly Alcoholism: Outpatient Treatment)
Student participates in clinical care of patients in a public mental hospital and community mental health center. Opportunity for observation and

* Dr. Bullard is Senior Consultant at Chestnut Lodge.

participation in a variety of treatment modalities: supervised individ
group therapy, somatic therapies, psychodrama. Research opp
available. 4-week elective periods. St. Elizabeths Hosp.

400 **Forensic Psychiatry (5)** Ward, Saiger,

Opportunity for supervised research; evaluation and rehabilitation o
inal offenders; contacts with courts; individual supervision and re
Individualized program by arrangement. 4-week elective periods. St
beths Hosp.

404 **Clinical Research and Psychopharmacology** (5) Goodwin an

(Formerly Medical and Legal Project on Aging)

Student participates in clinical research at the Clinical Psychol
Branch, N.I.M.H., which conducts a research and treatment progr
depression and manic-depressive disorders. Facilities include an in
ward, outpatient department, and biochemical laboratories. Student
on an individualized component of a major research project with
supervision by a research psychiatrist. Participation in clinical confe
didactic lecture series, research conferences, and planning meetin
week elective periods.

406 **Psychiatric Education, Research, and Administration** (5) Robinowitz and

(Formerly Family Studies)

Student preceptorship. Practicum experience, theoretical instruction,
ipation in research, and individual project. Close working contact
director and staff of education office of national specialty society.
tunity to observe operations and for contacts with leaders in field. S
gains knowledge and perspective of research and administration per
to women in medicine, psychiatric education, manpower developmen
vant to health care delivery, continuing education, federal and legi
affairs, health planning, and relation of medical education to practice
sonal interview required. 4-week elective periods. American Psych
Ass'n.

We

409 **Independent Studies** (5)

(Formerly Child Psychiatry in Community Mental Health)

Individualized studies, clinical training, or research experience. Selec
on basis of student interest, personal interview, and available resou
Possible subjects may include death and dying, suicide, medical ethi
other psychiatry and behavioral science interests of the student and
able faculty. 4-week elective periods.

Weis

411 **Group Therapy** (1)

Combined didactic and participatory course in group therapy. Stud
will function as observer-members of on-going group, and will partic
in lecture-supervision sessions.

Robi

412 **Mental Health Issues for Deaf People** (1)

Mental health and illness from the perspective of auditory depriv
Lectures, discussion, films, and field trips to educational and mental
facilities for deaf people are combined with varying degrees of pra
and research involvement.

413 **Autobiographical and Fictional Accounts of Madness** (1) Gorelick

Reading of a variety of personal accounts—some fictional, others autobiographical—of the inner experience of madness. Works include *Breakdown* by Robert Dahl and *50 Minute Hour* by Robert Lindner. St. Elizabeths Hosp.

414 **History of Mental Illness and Therapeutics** (1) Gorelick

Consideration of the historical periods of primitive healing, Greek medicine, Arabic medicine, Christian healing, witchcraft phenomena, and key developments of the last 200 years.

415 **Identity and Role of the Physician** (1) Robinowitz

The role and identity of the physician, with special emphasis on women physicians. Didactic material on the role and identity of the physician combined with experiential models, including group dynamics. (Limited to six students.)

416 **The Application of Psychoanalytic Principles to the Practice of Medicine** (1) Kaiser

Offered by the Extension Division of the Washington, D.C., Psychoanalytic Institute. (Limited to six students.)

417 **Geriatric Psychiatry** (1) Legler

Students accompany preceptor who functions as geriatric consultant to the National Capital Housing Authority.

418 **Medical Aspects of Alcoholism** (3) Wolin and Staff

Seminar in alcohol abuse and alcoholism focusing on the natural course of the illness, diagnosis, treatment, assessment, and evaulation of the alcoholic individual and family. Prerequisite: permission of instructor. (Fall)

419 **Seminar: Special Topics and Techniques in Family Psychotherapy** (3) Steinglass, Usher

An advanced seminar utilizing the concept of the family life cycle as a framework for identifying specific developmental phases in family life. Phase-specific problems and specialized intervention techniques will be introduced through readings and clinical discussions. Prerequisite: permission of instructor(s). (Spring)

420 **Research Methods for the Direct Study of the Family** (3) Reiss

Basic concepts in the design of quantitative studies of the development and function of the family. Topics to be covered include the use of theory, grounded observations, and personal experience in the design of research; analyses of verbal interaction; social systems analyses; a comparative analysis of interview methods, laboratory procedures, and naturalistic observations. Prerequisite: permission of instructor. (Fall)

421 **Supervision of Marital and Family Therapy** (3) Usher

Issues in the supervision of students of marital and family therapy. Various techniques of supervision (written report, audiotape and videotape, and one-way mirror) will be explored. Issues related to teaching and learning objectives, student and supervisor relationships, accountability, and confidentiality will be examined. Participants will be required to have a student whom they are currently supervising. Videotapes of the participants supervisory sessions will be examined in class. Prerequisite: permission of instructor.

422 Introduction to Family Theory and Therapy (3)

Readings in structural and problem-solving approaches to family th and live observation of families with recent hospitalized acute psych patients. Prerequisite: permission of instructor.

Radiology*

Chairman: D.O. Davis

Directors of Divisions: A.C. Wyman *(Acting, Diagnostic Radiology)*, Reba *(Nuclear Medicine)*, D.J. Goodenough *(Radiation Physics)*, C.C. R *(Radiation Oncology and Biophysics)*

Professors S.D. Rockoff, D.O. Davis, W.J. McSweeney, C.C. Rogers *(Radi Oncology)*, R.C. Reba *(Nuclear Medicine)*, A.M. Lewicki, B.J.L. Sauerb *(Nuclear Medicine)*, V.M. Varma *(Nuclear Medicine)*, W.C. Eckelman *clear Medicine)*

Clinical Professors A.C. Wyman, M.M. Reeder, J.L. Doppman, J.J. S *(Nuclear Medicine)*, J.G. Maier *(Radiation Oncology)*

Professorial Lecturer J.R. Andrews

Associate Professors M. Majd, J.A. Deye *(Radiation Physics)*, M.E. Bra *(Research)*, D.J. Goodenough *(Radiation Physics)*, R.O. Bondelid *(Resea* E.W. Bradley *(Research Radiobiology)*, R.E. Johnsonbaugh, S.N. Lee *(R tion Oncology)*, R.D. Ornitz *(Research)*, W.J. Rzeszotarski *(Resea Nuclear Medicine)*

Associate Clinical Professors H.J. Kicherer, C.F. Murphy, W.J. Nelson, Augustin, J. Burwell, J.D. Marriott, F.H. Gerber *(Nuclear Medicine)*, Jacobs, R.J. Lull, N.G. Nolan *(Nuclear Medicine)*, W.W. Olmsted, Katzen

Assistant Professors B. Potter, K.E. Weaver *(Radiation Physics)*, T. Pa *(Radiation Physics)*, L.S. August *(Research)*, R.M.S. Beck *(Radiologic T nology)*, D.R. Brallier, R.E. Gibson *(Research)*, G.E. Miller *(Research,* Paik *(Research—Nuclear Medicine)*, P. Shapiro *(Research)*, R.B. Theus *search)*, E.M. Druy, A.N. Gulati, A.M. Herskovic *(Radiation Oncol* R.F. Kiepfer *(Nuclear Medicine)*, D. Kramer, S.M. Levenson *(Resea* B.E. Rubin, S.W. Young, J.L. Frank

Adjunct Assistant Professors E.G. Briefel *(Radiation Physics)*, W.J. Bur R.M. Fisher, F.B. Adkins, T.J. Schmitz III, M.H. Selikson *(Radia Physics)*

Assistant Clinical Professors M.D.M. Faris, A.S. Cigtay, M.A. Thomas, Schumacher, J.A. Russotto *(Nuclear Medicine)*, S.J. Kurzbard, C.M. Ol P.F. Abraham, D. Feigin, N. Ghaed *(Nuclear Medicine)*, M. Rosen *(Radiation Physics)*, A.W. Baker *(Nuclear Medicine)*, J.B. Bowers, Brotman, J.L. Prather *(Nuclear Medicine)*, R.S. Frankel, D.D. Maxwell, Moniot *(Nuclear Medicine Technology)*, G.S. Staples, P. Weiner, M.A. W J.W. Winebright *(Nuclear Medicine Technology)*, K.S. Yingling

* Unless otherwise indicated, all faculty appointments are in the *Diagnostic Radiology* divisio

Instructors N.L. McElroy *(Radiation Physics)*, J.N. Albarelli *(Diagnostic Ultrasound)*, A. Castagnolo *(Allied Health)*

Adjunct Instructors G.R. Alkire *(Nuclear Medicine)*, E.J. Banasiak, D.E. Easterbrooks III, G.W. Elliot, F.M. Fender *(Radiation Oncology)*, T.R. Fewell, J.C. Hergenrother *(Nuclear Medicine)*, R.W. Jones, R.W. Killian, D.A. Marden, G.L. Colouris, W.F. Mellen, E.H. Whittemore, W.J. Weiler *(Nuclear Medicine)*, C.J. Zimmerman, Jr.

Clinical Instructors G. Tievsky, S.M. Perl, L. Wener, J.L. Murray

Special Lecturers J.H. Coenen *(Nuclear Medicine Technology)*, J.W. Andrews *(Nuclear Medicine Technology)*, D.M. Barron *(Nuclear Medicine Technology)*, D.F. Bates III *(Nuclear Medicine Technology)*, R.E. Brown *(Nuclear Medicine Technology)*, J.J. McBride, D.L. Daniels *(Nuclear Medicine Technology)*, T.A. Peters *(Nuclear Medicine Technology)*, R.A. Sassman *(Radiologic Technology)*

Courses numbered 40 through 190 are limited to students in the Associate in Science and Bachelor of Science degree programs in radiologic technology, nuclear medicine, and radiologic science and administration.

40 **Clinical Training and Experience in X-ray Technology I** (2) — Gerber, Marriott

Instruction and close supervision in the use of radiologic techniques to examine the digestive, urinary, female reproductive, central nervous, and circulatory systems; chest and abdomen radiography, orthopaedic radiography, ENT and neurologic radiography, portable radiographic examinations, pediatric radiography, nuclear medicine, radiation therapy.

41 **Clinical Training and Experience in X-ray Technology II** (2) — Gerber, Marriott

Prerequisite: Rad 40.

42 **Clinical Training and Experience in X-ray Technology III** (2) — Gerber, Marriott

Prerequisite: Rad 40, 41.

43 **Clinical Experience in Nuclear Medicine I** (4) — Reba and Staff

Practical study and supervised performance; emphasis on indications and contraindications, procedures and methods, physiological and procedural factors which may result in a false study, radiation safety techniques, preparation and development of new radiopharmaceuticals and research methodology, and administrative procedures.

44 **Clinical Experience in Nuclear Medicine II** (5) — Reba

Prerequisite: Rad 43.

50 **Radiologic Anatomy I** (4) — Zimmerman, Fisher

Human anatomy as applied to radiologic terminology. Structure and function of the human skeleton and topographical anatomy, both normal and pathological.

51 **Radiologic Anatomy II** (4) — Zimmerman, Fisher

Human anatomy as applied to radiographic procedures. Structural and functional approach, application to radiography of the digestive, respirato-

ry, excretory, endocrine, reproductive, and nervous systems and the orga
of special sense. Some discussion of medical and surgical diseas
Prerequisite: Rad 50.

55 **Stationary and Rectilinear Imaging** (3) All
Related anatomy, physiology, and pathology of imaging procedures; ba
methodology of these and related procedures, including bone, brain, liv
liver function, bone marrow, lung, liver-lung, transmission, cardiac blo
pool, cisternography, spleen, parathyroid, pancreas, lung ventilation, pa
tid ventriculography; miscellaneous scans; brain and cardiac flow studie

56 **Hematologic and Radionuclide Dilution Procedures** (3) All
Related anatomy, physiology, and pathology of hematologic and radi
nuclide dilution procedures; basic protocol for these procedures, includi
plasma volume and related plasma studies, red cell volume and related
cell studies, studies of iron metabolism, and the placental localization
scanning.

57 **Organ Concentration-Excretion Measurements** (3) Hergenroth
Related anatomy, physiology, and pathology of organ concentration-exc
tion measurements; the procedure for those measurements, including th
roid uptake and its variations, thyroid scan, metastatic chest survey, re
gram, renal scan, and renal flow study.

58 **Gastrointestinal Absorption Measurements** (1) Wei
Related anatomy, physiology, and pathology of gastrointestinal absorp
measurements; the procedure for those measurements, including fat abso
tion studies (triolein and oleic acid) and the three stages of the vitam
B-12 absorption study (Schilling test).

59 **Competitive Binding Radioimmunoassay** (2) Wei
Basic concepts of radioassay; basic procedure for any competitive bind
radioassay. Specific concepts and procedure for T3, T4, and serum B
determinations; factors affecting those determinations and the interpreta
of their results.

60 **Radiographic Technique I** (4) Easterbrooks, Schu
Theoretical and practical study of x-ray machines, equipment, patient p
tioning, and radiographic qualities; history and development of x-r
phototiming, x-ray tubes, and Bucky grids and their uses; anatomical la
marks, radiographic terminology, exposure factors, and variations; ra
graphic calibration (quality and quantity); marking of films and fact
governing good film quality. Laboratory work.

61 **Radiographic Technique II** (4) Easterbrooks, Schu
Preparation of exposure charts and use of radiation protection devic
practical applications of technical uses of stationary and portable equipm
under supervision; techniques for pediatric radiographs and methods of
sitioning and restriction; intra-oral radiography techniques. Photofluo
graphic chest units, departmental floor plans, basic office procedure
Laboratory work. Prerequisite: Rad 60.

62 **Darkroom Technology** (3) Zimmerman, Fo
Processing of film after exposure; care and handling of conventional
automatic darkroom equipment; types of film, handling and storage; m
and handling of chemicals and the action and quantity of these chemica

the processing of film; effects of heat and cold on these chemicals, diagnosing of various improper developing techniques. Laboratory work.

65 **Basic Chemistry** (3) Weiler

Introduction to basic chemistry: kinds of matter, atomic structure, the periodic table, chemical bonding, formulae and equations, solutions, acid-base reactions; introduction to organic chemistry and biochemistry; laboratory sessions.

66 **Radiopharmaceuticals** (3) Weiler

Uses of radionuclides in medicine, basic principles of a Mo-99/Tc-99m generator, radiopharmaceuticals and their action within the body, preparation of radiopharmaceuticals using generator-produced nuclides, quality control, accountability, procurement, clinical orientation.

70 **Electronics of Radiology I** (4) Elliot, Schmitz

Fundamental concepts of electricity such as battery types and construction, power and energy, simple circuits, series/parallel circuits, compound circuits. Description and function of various components of the circuits such as resistors and capacitors, magnetism and alternating current, magnetism and inductance, inductance and capacitance, and capacitance and transformers. Laboratory work.

71 **Electronics of Radiology II** (4) Elliot, Schmitz

Applications of electronic principles to x-ray equipment and components; transformers, meters, generators, rectifiers, basic electronics; electron tubes and solid state devices; equipment trouble-shooting and maintenance. Laboratory work. Prerequisites: Rad 70.

72 **Radiation Instrumentation** (5) Alkire

Theoretical and practical aspects of radiation detectors; types, components, and operation of detectors; collimators; geometry; introduction to rectilinear scanning; introduction to stationary imaging; clinical orientation.

75 **Fundamentals of Atomic and Nuclear Physics** (3) Hergenrother

Basic units, quantum theory, Bohr theory, atomic and nuclear structure, radioactivity and decay, alpha and beta particles, electromagnetic radiation, series decay, radioactive equilibrium, I.C.R.U.

80 **Mathematics of Radiology** (3) Elliot, Schmitz

Principles of mathematics as applicable to the physics of radiologic technology; use of logarithms, including multiplication, division, powers, and roots; scientific notation; geometry of the circle, square, and rectangle; basic trigonometric functions; linear equations in the unknown; Cartesian coordinate plane; slope of straight line; linear equations from given conditions; and graphic solution of two or more linear equations.

81 **Basic Mathematics** (3) Hergenrother

Review of basic high school mathematics, basic algebra, common and natural logarithms and their manipulation, linear and logarithmic graphing and manipulation of a log-log slide rule.

82 **Applied Technical Mathematics** (3) Hergenrother

Mathematics as applicable to nuclear medicine. Basic decay formula and its variations, calculation of doses of radionuclides, basic statistics terminology, frequency distributions, confidence limits, standard error, efficient distribution of counting time, statistics relating to rectilinear and stationary imaging.

90 **Ethics** (1) Zimmerman, Fa

Ethics of physician/technician/patient relationships. Responsibilities, moral and legal, to physician and patient; the rapport expected of technologist.

91 **Special Projects in Radiology** (arr.)

Independent study on an aspect of radiology worked out between the dent and the instructor.

92 **Basic Physics** (3) McE

Developmental course for students weak in physics and mathema training. Includes basic atomic structure, practice in computation, ele and magnetic statics, motors, transformers, concepts of electricity, circuits. Introduction to radiological physics including radiation pro tion, radiological units, and interactions of radiation with matter.

93 **Radiobiology and Radiation Dosimetry** (3) We

Interaction of radiation with matter; radiation effects on molecular, cell tissue, and organ levels; genetic and somatic effects of ionizing radiati classical and M.I.R.D. methods of absorbed dose calculation.

94 **Radiological Safety** (3) We

Introduction to radiation safety; units of radiation exposure and dose censing; NRC regulations; accountability and records, receipt, storage, dling, transportation, and disposal of radioactive materials; monitor shielding; dose-distance relationships; personnel dosimetry; radiation ness; radiac instruments; radiation safety clothing; radioactive procedure.

95 **Radiation Safety** (3) Jones, Me

Radiation tolerance, safety, and reporting photodosimetry; protective ods, control devices, shielding, half-life, detection, detection equipment, sign and operation, thermoluminescence (its operation and uses), termi ogy and subject matter. Laboratory work.

96 **Radiation Biology** (3) Jones, Me

Effects of radiation on basic cell structure through organ and whole-bo exposure; nature of radioactive particles and emissions, their effects on logical materials at the cellular and organismic level, particularly co mammalian systems.

97 **Special Procedures** (3) Zimmerman, Fa

Techniques of radiology employing contrast media. Fluoroscopy, films, body section radiography, pelvimetry, placentography, location foreign bodies in the eye, angiography, O.R. techniques, oral procedure stereoscopy, pediatric angiographic procedures. Prerequisite: Rad 61, 71

98 **Therapy Procedures** (1) Hergenrot

Introduction to radiation therapy and radium implants. Related anato physiology, and pathology of phosphorous–32 and iodine–131 therap and the technologist's responsibilities concerning them.

99 **Survey of Radiation Therapy and Nuclear Medicine** (3) Jones, Mur

Principles and practices of x-ray therapy and nuclear medicine techniq

purpose of radiation therapy and radioisotopes, their application and uses. Types of equipment and design. Prerequisite: Rad 51, 61, 71, 95, 96.

140 **Radiology Administration** (4) Bunnell

Key areas of administration; human skills, technical skills, and conceptual awareness as they pertain to radiologic management at the department level. Traditional management concepts and models developed through modern texts and current journals which address the topics of organizational behavior, planning, controlling, etc. Discussion and exploration of the logistics of managing a radiology section. Prerequisite: HCA 135, 142, 153, 156.

145 **Administrative Project: Diagnostic Radiology** (3) Bunnell

For students concentrating in diagnostic radiology. Students identify, develop, and complete a project for a radiology department using administrative principles. Prerequisite: Rad 140.

147 **Administrative Project: Nuclear Medicine** (3) Bunnell

For students concentrating in nuclear medicine. Students identify, develop, and complete a project for a nuclear medicine department using administrative principles. Prerequisite: Rad 140.

149 **Administrative Project: Radiation Therapy** (3) Bunnell

For students concentrating in radiation therapy. Students identify, develop, and complete a project for a radiation therapy department using administrative principles. Prerequisite: Rad 140.

150 **Radiology Senior Study** (2) Goodenough and Staff

Independent study for radiologic sciences and administration students. Faculty monitor acts as consultant to projects and gives minimal guidance. Project reports must be submitted for evaluation.

167 **Radiation Physics and Safety I** (3) Goodenough and Staff

Concepts of matter and energy and electromagnetic radiation. Mechanisms in the production of x-rays and x-ray circuits, including half-wave and full-wave rectification and three-phase generators. Interaction of radiation with matter, emphasizing the photoelectric, Compton, and pair-production effect. Radiation detection and dosimetry, Roentgen rad and rem units of radiation. Radiation safety as applied to diagnostic radiology, nuclear medicine, and radiotherapy, including effects of time, distance, and shielding. Maximum permissible concentrations, internal dose problems.

171 **Radiological Electronics and Engineering** (3) McElroy

Introduction to basic electronics and the operation, limitation, use, and principles in the selection of instrumentation. Transistors, power supplies, amplifiers, major circuit components of radiation detection instruments, gamma camera and rectilinear scanners, radiotherapy orthovoltage and linear accelerators, and diagnostic radiography equipment.

175 **Physics of Radiological Imaging** (3) Goodenough, Weaver

For students concentrating in diagnostic radiology. Image formation and transmission through radiological and related photo-optical devices, utilizing system analysis techniques. Concepts of sensitivity, contrast, and modulation transfer functions. Description and analysis of photo receptors, including film grids and Bucky and intensifier screens. Radiographic development process. Fluoroscopy, cine radiography, and video techniques; image

storage electronic radiography; and solid state imaging panels. Ultra
raphy and thermography. Demonstrations and experiments in contro
evaluation of radiologic imaging. Prerequisite: Rad 167.

176 **Physics of Nuclear Medicine** (3) Goodenough, B
For students concentrating in nuclear medicine. Concepts of radioa
including beta decay, isomeric transitions, electron capture, internal
tion, alpha decay, and the auger effect. Isotopic half-life secular
sient equilibrium. Artificial transmutations, nuclear reactions, counting
tistics, and selection of instrumentation. Scintillation spectrometry
niques. Rectilinear scanners, gamma camera, and computer technolo
nuclear medicine. Demonstrations and experiments in control and ev
tion of imaging. Prerequisite: Rad 167.

177 **Dosimetry in Radiation Therapy** (3) Deye, Pa
For students concentrating in radiotherapy. Concepts of depth dos
dose curves, and tissue air ratios for different energies, TSD, and field
Techniques of treatment planning for stationary, multiple, and moving
tals for Co-60 and megavoltage linear accelerators. Concepts of
fields and compensation for multiple TSD surfaces and tissue inhomo
ties. Dosimetry of linear sources. Quimby and Paterson Parker do
systems. Computer techniques in radiotherapy. Introduction to the do
try of electrons, neutrons, and the heavy particles. Demonstrations a
periments illustrating dosimetric principles. Prerequisite: Rad 167

Br
190 **Radiobiology** (3)
Advanced course in biological aspects of radiation. Chemical, ph
and genetic effects of radiation on cells and organisms. Radioecolog
ty, and health. Legal aspects of control. Prerequisite: Rad 93 or 96

195 **Directed Study in Radiation Physics** (2) Goodenough and S
Projects in selected specialty demonstrating applications of radiation p
ics, imaging or dosimetric principles to radiographic quality control
evaluation of radiological equipment systems. Prerequisite: Rad 167
175 or 176 or 177.

383 **Clinical Radiology** (5) Wyman and S
Radiologic differential diagnosis; emphasis on the role of diagnostic
gy in clinical problem-solving. Each student is assigned a patient p
tion and correlates the radiologic examinations with the clinical manife
tions of disease. Students prepare brief clinical and radiological summ
and participate in procedures, case conferences with staff members, and
teraction with medical and surgical staff members. Daily lectures and
conferences. Audiovisual self-instructing material. 4-week elective p
Univ. Hosp.

384 **Diagnostic Radiology** (5) Burwell and S
Participation in general radiography, fluoroscopy, and special proced
interpretation of radiologic procedures with staff; review and study of
ing film file. Attendance at medical, surgical, and pediatric staff
ences. 4-week elective periods. Fairfax Hosp.

385 **Nuclear Medicine** (5) Reba, Eckelman and S
Introduction to the clinical and research applications of radiotracers.
chemistry, radiation detection, and instrumentation, employing both
ry and practice. Study of organ imaging techniques, by lectures, co

ences, and participation in patient care. Introduction to radiobioassay. Research experience in radioactive drug development, using *in vivo* animal distribution and *in vitro* specific receptor binding assays. Correlation between clinical problems and nuclear diagnosis. 4-week elective periods. Univ. Hosp.

386 **Radiation Oncology** (5) Rogers and Staff
(Formerly Radiation Therapy)
Introduction to radiotherapeutic techniques, physics of high-energy radiation and instrumentation. Radiation treatment and correlated management of malignant diseases; emphasis on decision-making in a clinical practice. 4-week elective periods. Univ. Hosp.

387 **Subspecialty Diagnostic Radiology** (5) Staff
Subspecialty offerings include pulmonary, gastrointestinal, urologic, obstetric and gynecologic, neurologic, and pediatric. 4-week elective periods. Univ. Hosp.

388 **Diagnostic Radiology** (5) Reeder and Staff
Participation in general radiography, fluoroscopy, with special procedures; interpretation of radiologic procedures with staff; review and study of teaching film file; conferences. 4-week elective periods. Walter Reed Gen. Hosp.

389 **Diagnostic Radiology** (5) Ochs and Staff
Same as Rad 388. 4-week elective periods. Nat'l Naval Med. Center.

390 **Extramural Radiology Elective** (arr.)
The department arranges for students to spend elective periods at other institutions. Interested students should contact the chairman of the department.

391 **Diagnostic Radiology** (5) Schumacher and Staff
Same as Rad 388. 4-week elective periods. Wash. Hosp. Center.

urgery

hairman: P.C. Adkins

irectors of Divisions: P.C. Adkins *(Thoracic and Cardiovascular Surgery)*, P.E. Shorb, Jr., *(General Surgery)*, J.G. Randolph *(Pediatric Surgery)*, L.W. Thompson *(Plastic Surgery)*, J.M. Gitelman *(Oral Surgery)*

rofessors G.S. Letterman *(Plastic Surgery)*, J.G. Randolph, P.C. Adkins, F.W. Plugge IV, W.J. Fouty, L.T. Bowles, P.E. Shorb, Jr., R.P. Altman, N.T. Tsangaris

linical Professors V.M. Iovine, G.A. Higgins, Jr., E.A. Gould, J.R. Thistlethwaite, N.H. Isaacson, J.J. Weinstein, M. Mills

ssociate Professors H.C. Pierpont, T.C. Alford, W.L. Joseph, L.W. Thompson, F.M. Midgley, K.D. Anderson, H.E. Ashworth, G.W. Geelhoed, J.M. Giordano, H.J. Gortinkel, S.A. Rosenberg

Associate Clinical Professors M.A. Schurter, N.P.D. Smyth, J.M. Keshishian, W.D. Latham, F.B. Brandt, J.W. Canter, S.M. Kirson, R.D. Ornitz, C.A. Sil

Associate Professorial Lecturer L.E. Church *(Oral Surgery)*

Assistant Professors L.E. Smith, R.C. Cochran, D.L. Sturtz, J.R. Fletcher, G. Gregory III

Assistant Clinical Professors L.R. Perna, F. Sacasa *(Oral Surgery)*, R.D. Sharp *(Oral Surgery)*, R.L. Flax, R.R. Cameron, H.F. Sears II, G.B. Helfrich, S. Teunis, S.M. Knoll, L.W. Gray, Jr., J.M. Garcia, J.R. Appleton, S.G. Cro land, B.F. Frankel *(Oral Surgery)*, J.M. Gitelman *(Oral Surgery)*, M.H. Cobb G.J. Collins, Jr., K. Matini *(Plastic Surgery)*, P.J. Corso, J.J. O'Conn P. Zamick *(Plastic Surgery)*, N.A. Odyniec, B.J. Levin

Clinical Instructors J.H. Sager, S. Holen *(Periodontics)*, R.S. Siegel *(Oral Su gery)*, C.L. Magassy *(Plastic Surgery)*, E.D. Hanowell

Special Lecturers J.H. Bayly, R.N. Scott

302 **Clinical Clerkship in Plastic Surgery** (2)
Two-week elective periods. Univ. Hosp.

*303 **Clinical Clerkship** (10)
Eight weeks at Univ. Hosp. and Nat'l Naval Med. Center.

376 **Advanced Surgery** (5)
Participation in total patient care, including operative procedures un close supervision. 4-week elective periods arranged at affiliated hospita

378 **Intensive Care Unit** (5) Absolon and St
Introduction to the management of acutely ill surgical patients, includ cases involving trauma; neurosurgery; and cardiovascular-thoracic, abdo nal, and orthopaedic surgery. 4-week elective periods. Wash. Hosp. Cent

379 **Transplantation Immunology** (5) Geelhoed
Clinical renal transplantation and preservation. Daily teaching rounds, erature conference, seminar presentation, weekly surgical-medical nephro gy rounds. 4-week elective periods. Univ. Hosp.

383 **Endocrine Surgery** (5) Geelhoed
Control of hyperfunction and neoplasms of thyroid, parathyroid, adren and pancreatic islet cell glands. Collaboration with the endocrinology s vice for a balanced perspective on management of endocrine disorder 4-week elective periods. Univ. Hosp.

384 **Thoracic-Cardiovascular Surgery** (5) Adkins
Basic principles used in thoracic and cardiovascular surgery. 4-week ele tive periods. Univ. Hosp. and Clinic.

385 **Plastic Head and Neck Surgery** (5) Thompson
Preoperative and postoperative care, operating room procedures, clinical tivities, conferences. Aesthetic surgery, head and neck cancer, maxillofac trauma, hand surgery, congenital anomalies about the head and neck, an burns. 4-week elective periods. Univ. Hosp. and Clinic.

* Required for medical students.

386 **Pediatric Surgery** (5) — **Randolph**

Participation in an active, closely supervised surgical service for infants and children, including congenital defects, cardiac surgery, trauma, and neoplasms. 4-week elective periods. Children's Hosp.

387 **Plastic Surgery** (5) — **Thompson, Parsons**

Experience comparable to a surgical internship with integral participation in all activities of the service, including preoperative and postoperative care, operating room procedures, out-patient clinics, and conferences. Basic principles of wounds and their management, aesthetic and reconstructive surgery, and congenital anomalies. 4-week elective periods. Walter Reed Gen. Hosp.

388 **Plastic Surgery** (5) — **Thompson, Dempsey**

Participation in an active plastic surgery service, principally aesthetic surgery, but also including other types of plastic surgery. Out-patient clinics, operating room procedures, and conferences. 4-week elective periods. Nat'l Naval Med. Center.

389 **Surgical Preceptorship** (5) — **Iovine, Thistlethwaite, Isaacson**

Care of general surgical patients as seen in private practice. 4-week elective periods.

390 **Extramural Surgery Elective** (arr.)

The department arranges for students to spend one or more elective periods at other institutions. Students must have the approval of the chairman of the department.

391 **Special Programs** (5) — **Tsangaris**

4-week elective periods. Univ. Hosp.

392 **Peripheral Vascular Surgery** (5) — **Keshishian, Smyth**

Study and application of vascular surgery. 4-week elective periods. Wash. Hosp. Center.

393 **Burns** (5) — **Fouty**

4-week elective periods.

395 **Experimental Surgery** (5) — **Geelhoed**

Participation in existing research projects and experimental operative procedures; assigned reading. 4-week elective periods. Surgical Research Lab., Ross Hall.

rology

hairman: H.C. Miller, Jr.

rofessors L.R. Culbertson, H.C. Miller, Jr.

djunct Professor B.S. Azoury

linical Professors E.E. Ferguson, W.D. Jarman, F.J. Frensilli, F.T. Reuter

Associate Professors M. Edson, A.B. Belman

Associate Clinical Professors H.A. Goldberg, C. Rodriguez, J. Kenealy, B. Mittemeyer, W.L. Banfield III, H.S. Semerdjian

Assistant Professors P.L. Gross, A.M. Kwart

Assistant Clinical Professors G. Ottenberg, R.C. Rhame, G. Dudas, H.J. Klap- roth, R.E. Ware, I.S. Young, E.H. Soifer, I.J. Spence, D.M. Seitzman, Shuman, D.T. Schwartz, F.B. Hendricks, H. Salcedo, M.P. Berger, W Glover, Jr.

Clinical Instructors B.O. Black, E.G. Abramson, J.B. Alperstein, S.O. Kaz H.E. Bondy, J.D. Francis, J.A. Gargurevich, M.I. Murdock, S.L. Werm P.I. Shah

380 **Clinical Urology** (5)
Out-patient and diagnostic urology, cystoscopy, and radiographic proc dures. 2-week elective periods. Univ. Hosp.

381 **Clinical Urology** (5) Miller and St
Observation of urologic conditions and procedures for diagnosis and trea ment; radiologic and pathologic studies, endoscopy and surgery, collater reading, weekly staff conference. 2-week elective periods. Univ., V.A Children's Hosps., Nat'l Naval Med. Center, Walter Reed Army Medi Center.

382 **Clinical Urology** (5) Hendricks and St
Observation of urologic conditions and procedures for diagnosis and trea ment, radiologic and pathologic studies, endoscopy and surgery, collater reading, weekly staff conference. 2-week elective periods. V.A. Hosp.

383 **Clinical Urology** (5)
Out-patient and diagnostic urology; cystoscopic and operative urology. week elective periods. Nat'l Naval Med. Center.

390 **Extramural Urology Elective** (arr.)
The department arranges for students to spend elective periods in other in stitutions. Interested students should contact the chairman of the depart ment.

302 **Clinical Clerkship** (2)
2-week elective periods. Univ. Hosp.

THE SCHOOL OF MEDICINE AND HEALTH SCIENCES

Faculty and Staff of Instruction*

EMERITI

Theodore Judson Abernethy, *Professor Emeritus of Clinical Medicine*
B.S. 1925, Denison University; M.D. 1929, Johns Hopkins University

Garnett Cyril Albritton, *Professor Emeritus of Physiology*
B.A. 1916, University of Missouri; M.D. 1921, Johns Hopkins University

Louis Katz Alpert, *Professor Emeritus of Medicine*
B.S. 1928, M.D. 1932, Yale University

Harry Ford Anderson, *Professor Emeritus of Dermatology and Syphilology*
M.D. 1924, University of Cincinnati

William Staton Anderson, *Professor Emeritus of Clinical Child Health and Development*
B.A. 1927, Duke University; M.D. 1931, Johns Hopkins University

Walter Andrew Bloedorn, *Professor Emeritus of Medicine*
M.D. 1909, Creighton University; B.A. 1915, M.A. 1916, Sc.D. 1948, George Washington University

Thomas McPherson Brown, *Professor Emeritus of Medicine*
B.A. 1929, Swarthmore College; M.D. 1933, Johns Hopkins University

Dexter Means Bullard, *Professor Emeritus of Clinical Psychiatry*
Ph.B. 1920, Yale University; M.D. 1923, University of Pennsylvania

Paul Calabrisi, *Professor Emeritus of Anatomy*
B.A. 1931, Catholic University of America; M.A. 1940, George Washington University; Ph.D. 1955, Cambridge University

Jeremiah Keith Cromer, *Professor Emeritus of Clinical Obstetrics and Gynecology*
M.D. 1929, B.A. 1931, George Washington University

Henry Lauran Darner, *Professor Emeritus of Clinical Obstetrics and Gynecology*
B.A. 1916, Western Maryland College, M.D. 1920, Johns Hopkins University

* Faculty and Staff of Instruction listed here and at the head of each department represents appointments current as of June, 1978. Faculty and staff members who hold appointments in two or more departments have the department of primary responsibility listed first.

Samuel Mayer Dodek, *Professor Emeritus of Clinical Obstetrics and Gynec*
B.A. 1923, George Washington University; M.D. 1927, Thomas Jefferson University; M.A.
Case Western Reserve University

William Rankin Duryee, *Research Professor Emeritus of Pathology (Exp*
mental)
B.A. 1927, Ph.D. 1933, Yale University

James Albert Dusbabek, *Professor Emeritus of Clinical Obstetrics and G*
cology
M.D. 1934, George Washington University

Clayton Bernard Ethridge, *Professor Emeritus of Medicine*
M.D. 1933, University of Virginia

Clarence Kendall Fraser, *Professor Emeritus of Clinical Obstetrics and G*
cology
Ph.B. 1931, College of the Holy Cross; M.D. 1935, Tufts University

James Quincy Gant, Jr., *Professor Emeritus of Clinical Dermatology*
B.A. 1930, M.S. 1931, Ohio State University; M.D. 1935, Medical College of Virgin
Virginia Commonwealth University

Robert Henry Groh, *Professor Emeritus of Clinical Neurology*
B.S. 1935, M.D. 1937, University of Pittsburgh

Clarence Richard Hartman, *Associate Professor Emeritus of Microbiology*
B.A. 1933, M.D. 1936, George Washington University

Robert Sexton Higdon, *Professor Emeritus of Dermatology*
B.S. 1933, Millsaps College; M.D. 1937, Tulane University

Alec Horwitz, *Professor Emeritus of Clinical Surgery*
B.A. 1920, M.D. 1923, George Washington University; M.S. in Surg. 1927, University of
nesota

Paula Reines Kaiser, *Associate Professor Emeritus of Anesthesiology*
M.B., Ch.B. 1936, University of St. Andrews, Scotland; M.D. 1937, State University of
York

Hayden Kirby-Smith, *Professor Emeritus of Clinical Dermatology*
B.S. 1927, University of the South; M.D. 1937, George Washington University

Calvin Trexler Klopp, *Professor Emeritus of Surgery*
B.A. 1934, Swarthmore College; M.D. 1938, Harvard University

Chester Elwood Leese, *Professor Emeritus of Physiology*
B.A. 1922, M.A. 1925, Ph.D. 1930, University of Iowa

Edward Lewis, *Professor Emeritus of Clinical Pediatrics*
M.D. 1918, George Washington University

Reginald Spencer Lourie, *Professor Emeritus of Child Health and Develop*
and of Psychiatry and Behavioral Sciences
B.S. 1930, Cornell University; M.D. 1936, State University of New York Downstate Me
Center; Med.Sc.D. 1941, Columbia University

Benjamin Manchester, *Clinical Professor Emeritus of Medicine*
M.D. 1935, George Washington University

Preston Alexander McLendon, *Professor Emeritus of Pediatrics*
B.S. 1913, Wake Forest University; M.D. 1915, Columbia University

Joseph Francis Ney, *Professor Emeritus of Clinical Medicine*
B.S. 1931, University of Virginia; M.D. 1935, Harvard University

Margaret Mary Nicholson, *Professor Emeritus of Clinical Pediatrics*
B.A. 1922, M.D. 1925, George Washington University

George Nordlinger, *Professor Emeritus of Clinical Obstetrics and Gynecol*
B.A. 1918, M.D. 1922, George Washington University

Thomas Martin Peery, *Professor Emeritus of Pathology*
B.A. 1928, D.M.S. 1966, Newberry College; M.D. 1932, Medical University of South Carolina

Lois Irene Platt, *Associate Professor Emeritus of Pathology*
B.A. 1931, Goucher College; M.D. 1946, University of Maryland

Herbert Pollack, *Professor Emeritus of Clinical Medicine (Biochemistry)*
B.A. 1925, Washington and Lee University; M.D. 1929, Cornell University; Ph.D. 1933, University of Minnesota

Andrew Gabriel Prandoni, *Professor Emeritus of Clinical Medicine*
B.S. 1934, Fordham University; M.D. 1938, State University of New York Downstate Medical Center

Lawrence Elias Putnam, *Professor Emeritus of Clinical Medicine*
B.A. 1930, M.D. 1934, Harvard University

Mary Louise Robbins, *Professor Emeritus of Microbiology*
B.A. 1934, American University; M.A. 1940, Ph.D. 1944, George Washington University

Benjamin Rones, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1922, M.D. 1926, Johns Hopkins University

Ernest Alfred Watson Sheppard, *Professor Emeritus of Clinical Ophthalmology*
M.D., C.M. 1926, Queens University, Canada

Harold Stevens, *Professor Emeritus of Neurology*
B.S. 1933, Pennsylvania State University; M.A. 1934, Ph.D. 1937, M.D. 1941, University of Pennsylvania

Donald Harrison Stubbs, *Professor Emeritus of Clinical Anesthesiology*
B.A. 1929, M.A. 1931, M.D. 1932, George Washington University

ra Rockwood Telford, *Professor Emeritus of Anatomy*
B.A. 1931, M.A. 1933, University of Utah; Ph.D. 1942, George Washington University

homas Carlton Thompson, *Professor Emeritus of Clinical Urology*
B.S. in Med., M.D. 1920, George Washington University

anet Graeme Travell, *Professor Emeritus of Clinical Medicine*
B.A. 1922, Wellesley College; M.D. 1926, Cornell University

arleton Raymond Treadwell, *Professor Emeritus of Biochemistry*
B.A. 1934, Battle Creek College; M.S. 1935, Ph.D. 1939, University of Michigan

ohn Augustine Washington, *Professor Emeritus of Clinical Child Health and Development*
B.A. 1924, Virginia Military Institute, B.S. 1926, University of Virginia; M.D. 1930, Johns Hopkins University

mes Winston Watts, *Professor Emeritus of Neurological Surgery*
B.S. 1924, Virginia Military Institute; M.D. 1928, University of Virginia

chard Wallace Wilkinson, *Professor Emeritus of Clinical Ophthalmology*
B.A. 1925, M.D. 1928, George Washington University; M.S. in Med. 1932, University of Pennsylvania

nathan Marshall Williams, *Clinical Professor Emeritus of Neurological Surgery*
B.S. in Med. 1936, Loyola University of Chicago; M.D. 1938, University of Chicago

TIVE

e Samuel Abraham, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1938, Westminster College, Pennsylvania; M.D. 1950, George Washington University

Andreas Andrew Abraham, *Associate Professor of Pathology*
M.D. 1953, University of Szeged, Hungary

Kristof Abraham, *Associate Clinical Professor of Neurology*
M.D. 1952, Budapest University

Palma Feheruari Abraham, *Assistant Clinical Professor of Radiology*
M.D. 1954, University of Budapest

Michael David Abramowitz, *Assistant Professor of Child Health and Development and of Anesthesiology*
M.B., B.Ch. 1972, University of Witwatersrand, South Africa

Charles Barrett Abrams, *Assistant Clinical Professor of Medicine*
B.S. 1967, Bethany College; M.D. 1971, West Virginia University

Edward Gerald Abramson, *Clinical Instructor in Urology*
B.A. 1962, University of Pennsylvania; M.D. 1967, University of Virginia

Fred Paul Abramson, *Associate Professor of Pharmacology and of Pathology*
B.A. 1962, Case Western Reserve University; Ph.D. 1965, Ohio State University

R. Marshall Ackerman, *Clinical Instructor in Orthopaedic Surgery*
B.S. 1958, M.D. 1962, University of Pittsburgh

Charles Omar Ackers, *Special Lecturer in Pathology*
B.A. 1972, Augustana College

John Pletch Adams, *Professor of Orthopaedic Surgery and of Child Health and Development*
B.S. 1943, University of Missouri; M.D. 1945, Washington University

Edward Adelson, *Associate Clinical Professor of Medicine*
B.S. 1943, M.D. 1947, Tufts University

Francis Bernard Adkins, *Adjunct Assistant Professor of Radiology*
B.S. 1968, Pratt Institute; M.S. 1971, Rutgers—The State University; Ph.D. 1978, University of Chicago

Paul Charles Adkins, *Lewis Saltz Professor of Surgery*
B.A. 1944, M.D. 1948, Johns Hopkins University

Mohan Teckchand Advani, *Associate Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1955, Punjab University, India; M.B., B.S. 1960, Osmani University, India; D.P.H. Mysore University, India

Lewis Francis Affronti, *Professor of Microbiology*
B.A. 1950, M.A. 1951, State University of New York at Buffalo; Ph.D. 1958, Duke University

Sydney John Aidinis, *Assistant Professor of Anesthesiology*
M.B., B.S. 1965, Adelaide University; F.F.A.R.C.S. 1972, Royal College of Surgeons

Brent Roger Ain, *Clinical Instructor in Orthopaedic Surgery*
B.A. 1967, University of Rochester; M.D. 1972, Tulane University

Cosimo Ajmone-Marsan, *Associate Clinical Professor of Neurology*
M.D. 1942, University of Torino, Italy

Julio Estuardo Alarcon, *Clinical Instructor in Obstetrics and Gynecology*
M.D. 1966, University of Trujillo, Peru

Judith Nolin Albarelli, *Instructor in Radiology (Diagnostic Ultrasound)*

Chalom Albert, *Assistant Clinical Professor of Anesthesiology*
B.A. 1949, M.D. 1953, American University of Beirut

Dan George Albert, *Assistant Clinical Professor of Ophthalmology and of Child Health and Development*
B.S. 1938, Ohio State University; M.D. 1950, State University of New York Upstate Medical Center

Ernest Narinder Albert, *Professor of Anatomy*
B.S. 1959, High Point College; M.S. 1963, University of Pittsburgh; Ph.D. 1965, Georgetown University

Morris Sheldon Albert, *Assistant Clinical Professor of Child Health and Development*
B.A. 1956, Harvard University; M.D. 1960, Boston University

Solomon Naphtali Albert, *Associate Clinical Professor of Anesthesiology*
B.A. 1936, M.D. 1940, American University of Beirut

Yousef Al-Doory, *Associate Professor of Pathology (Laboratory Medicine)*
B.S. 1945, University of Baghdad; M.A. 1951, University of Texas; Ph.D. 1954, Louisiana State University

ewart Leonard Aledort, *Assistant Clinical Professor of Psychiatry and Behavioral Sciences*
B.S. 1958, City University of New York, Queens College; M.S. 1960, University of Connecticut; M.D. 1964, Yeshiva University

heodore Crandall Alford, *Associate Professor of Surgery*
B.A. 1944, Haverford College; M.D. 1947, Johns Hopkins University

len R. Alkire, *Adjunct Instructor in Radiology (Nuclear Medicine)*

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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30

OCTOBER 1978

S	M	T	W	T	F	S
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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

NOVEMBER 1978

S	M	T	W	T	F	S
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12	13	14	15	16	17	18
19	20	21	22	23	24	25
26	27	28	29	30		

DECEMBER 1978

S	M	T	W	T	F	S
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10	11	12	13	14	15	16
17	18	19	20	21	22	23
24	25	26	27	28	29	30
31						

JANUARY 1979

S	M	T	W	T	F	S
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7	8	9	10	11	12	13
14	15	16	17	18	19	20
21	22	23	24	25	26	27
28	29	30	31			

FEBRUARY 1979

S	M	T	W	T	F	S
				1	2	3
4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28			

MARCH 1979

S	M	T	W	T	F	S
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4	5	6	7	8	9	10
11	12	13	14	15	16	17
18	19	20	21	22	23	24
25	26	27	28	29	30	31

APRIL 1979

S	M	T	W	T	F	S
1	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY 1979

S	M	T	W	T	F	S
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		

1978 SUMMER TERM

May 22	Registration for all sessions *Monday* Application for September 30 graduation due as p registration
May 23	First-session and 13-week session classes begin *Tu*
May 29	Holiday *Monday*
July 3	First-session classes end *Monday*
†*July 4*	Holiday *Tuesday*
July 5, 6, 7	First-session examination period *Wednesday–Friday*
July 10	Registration for students attending second-session *Monday* Application for September 30 graduation due as pa registration
July 10	Second-session classes begin *Monday*
August 16	Last day of classes *Wednesday*
August 17, 18, 19	Second-session and 13-week session examination p *Thursday–Saturday*

* This calendar is subject to change.

† Courses in the 13-week session will meet on their regularly scheduled days during the week of J
3, excluding the holiday on Tuesday, July 4.

1978 FALL SEMESTER

August 17–18 Registration *Thursday* (12:30–7 p.m.) and *Friday* (3–7 p.m.)
Application for February graduation due as part of registration
August 21 Classes begin *Monday*
September 4 Labor Day (holiday) *Monday*
October 6 S.J.D. dissertations of February candidates due *Friday*
November 22 Thanksgiving recess begins after last class *Wednesday*
November 27 Classes resume *Monday*
December 2 Last day of fall-semester classes *Saturday*
December 4–15 Reading and examination period

1979 SPRING SEMESTER

January 2 LL.M. theses of February candidates due *Tuesday*
**January 4–5* Registration *Thursday–Friday*
Application for May graduation due as part of registration
January 8 Classes begin *Monday*
January 26 S.J.D. dissertations of May candidates due *Friday*
February 19 Winter Convocation (holiday) *Monday*
March 1 Application for 1979–1980 teaching fellowships due *Thursday*
March 24 Spring recess begins after last class *Saturday*
April 2 Classes resume *Monday*
April 26 Last day of spring-semester classes *Thursday*
May 1 LL.M. theses of May candidates due *Tuesday*
April 27–May 11 Reading and examination period
May 20 Commencement *Sunday*

* Hours of registration to be announced.

THE NATIONAL LAW CEN

HISTORY

THE LAW CENTER, the oldest law school in the District of Columbia, w
tablished in 1865 with a formal program of two years of study. Th
largely through the efforts of the Reverend George Whitefield Samson,
dent of Columbian College, whose action resulted in the purchase of a se
building for holding law classes. The building had belonged to Trinity Ch
of which Francis Scott Key had been Senior Warden. It was occupied b
Law Center until 1884.

Sixty graduates, from 22 of the then 37 states, received degrees in
The school continued to have a student body and a faculty which rec
the fact that it was at the seat of our nation's government. Associate Ju
David J. Brewer and John Marshall Harlan of the Supreme Court o
United States were among the prominent members of the bench and bar
were on the faculty.

In 1877, one year after the first such program was adopted in the Un
States, the Law Center instituted a course leading to the degree of Maste
Laws. In 1898, the course of instruction for the degree of Bachelor of
was extended to three years. The Law Center took part in 1900 in the org
zation of the Association of American Law Schools.

In the past quarter-century the Law Center expanded its course and sch
offerings with consideration of the needs of first-degree and graduate stude
The degree of Doctor of Juridical Science was instituted in 1940. The
of foreign lawyers who came to this country and who required addi
preparation for law work in the United States resulted in the creation of
grams for the degrees of Master of Comparative Law in 1946 and Master
Comparative Law (American Practice) in 1951.

In 1954, National University School of Law, which had an important
in legal education in the District of Columbia since 1869, was absorbed by
George Washington University Law School.

Since 1954, programs of special research and study have enriched the
curriculum. These include the Environmental Law Program; Patent Law
gram; International Law Program; the Government Contracts Program;
the Law, Science, and Technology Program.

Additionally, the Law Center has been a leader in developing a curric
to meet the legal needs of the poor and the disadvantaged. A clinical

program has been developed which is the equal of that at any law sc
the nation. Special projects include the Consumer Protection Cen
George Washington Legal Aid Bureau, and individual projects supervised
Law Students Civil Rights Research Council.

Realizing the need for legal services for all members of society, t
tional Law Center, while maintaining its strong course offerings in pate
administrative law, and corporate law, has developed a rich selection of c
in poverty law covering sales, civil rights, and welfare.

Alumni of the National Law Center have included United States Se
Congressmen, Ambassadors, and Cabinet Members. Its graduates hav
on to become members of both the federal and state judiciaries as w
noted members of the bar of every state in the union.

UNIVERSITY POLICY ON EQUAL OPPORTUNITY

George Washington University does not discriminate against any person
basis of sex, race, color, religion, national origin, or handicap in any of its
cation programs or activities. Federal regulations implementing Title IX
Education Amendments of 1972 and Section 504 of the Rehabilitation A
1973 call for an explicit statement that the requirement not to discrimin
the basis of sex or handicap extends to employment in and admission to
programs and activities. The University is also subject to the District of
lumbia Human Rights Law.

Inquiries concerning the application of this policy and federal laws and
lations concerning discrimination in education or employment programs
activities may be addressed to Marianne Phelps, Assistant Provost for Af
ative Action, Rice Hall, Washington, D.C. 20052, or to the Director of
Office for Civil Rights of the Department of Health, Education, and Wel

LOCATION IN THE NATION'S CAPITAL

Of special significance is the location of the National Law Center in the
tion's capital, the focal point of the law in action, both American and inte
tional. The work of the Center goes on in this environment, presenting
unique opportunity for observation and study of federal agencies—judicial,
islative, and administrative. Readily accessible are the Supreme Court of
United States, the federal trial and appellate courts of the District of Colu
and, in addition, federal courts of special jurisdiction, such as the United St
Court of Claims, the United States Court of Customs and Patent Appeals, C
Tax Court of the United States, and the Court of Military Appeals. Co
federal legislation can be studied as it is considered by Congressional comm
tees and as it comes up for debate on the floors of the House of Represen
tives and the Senate. With respect to the federal administrative agencies, s
dents here in Washington have matchless opportunities for study and obse
tion. They can attend informal and formal hearings of these agencies and
obtain from the docket sections complete records of administrative adjudica
in specific cases. Illustrative of such federal agencies are the Interstate Co
merce Commission and the Civil Aeronautics Board in the field of transpo
tion; the Federal Trade Commission in the field of trade regulation; the Sec

ties and Exchange Commission in the field of security issues and corporate finance; the National Labor Relations Board in the field of labor-management relations; the United States Patent Office in the field of patent law; the Federal Power Commission in the field of water, natural gas, and electric power; and the Federal Communications Commission in the field of radio and television.

Supplementing these environmental advantages of law in action are the exceptional research library collections in the Library of Congress, in the various departments of the federal government, and in the libraries of the headquarters of national and international organizations. The notable library of the Carnegie Foundation for International Peace has been acquired by George Washington University for use of research students in international and comparative law, fields with respect to which Washington has come to be called "The Capital of the World."

The years of residence at law school are years of participation in the life of the community, which in the case of the George Washington University National Law Center is the government of the United States. As a consequence, the study of law takes on added meaning, whether the goal be government service or practice, general or specialized, and whatever the community in which the student plans to practice.

OBJECTIVES

The purpose of the National Law Center is to prepare men and women to meet the needs of society in many fields of law and to encourage scholarly research and writing in the law. As a national law school, the Center does not emphasize any particular geographic area in its instruction; therefore, it prepares students to practice law in any part of the country. The Center also offers a program of legal education for foreign students. The Law Center seeks to fulfill these objectives through (1) a rich and varied curriculum taught by eminent professors and highly qualified specialized instructors; (2) an extensive clinical law program in which students learn legal skills by actual practice; (3) two law journals which specialize in public law and international law; (4) trial practice; (5) participation in the Van Vleck Appellate Case Club (a moot court competition); (6) a series of student professional co-curricular activities; (7) studies on an advanced level for foreign as well as for American students; (8) a continuing legal education program for members of the bar; and (9) scholarly research and writing in the law.

The National Law Center Complex

The National Law Center Complex consists of three buildings: Stockton Hall, Bacon Hall, and the Jacob Burns Law Library.

STOCKTON HALL

Stockton Hall is the main classroom building. It also holds faculty offices and the offices of the Dean and the Associate Deans of the Law Center, as well as the Records Office and student lounges.

BACON HALL

Bacon Hall houses faculty offices; student lounges; the *George Wash*
Law Review Office; the Government Contracts Program; the Admissio
fice; the Law Center Placement Office; the offices of the *Journal of I*
tional Law and Economics; the Black America Law Student Associati
Law Students Civil Rights Research Council; the Van Vleck Appellat
Club; the *Advocate*, the law school newspaper; the Student Bar Associati
Consumer Protection Center; the Legal Aid Bureau; and Movimiento
Latino, the national Latino law students association.

THE JACOB BURNS LAW LIBRARY

The Law Library of approximately 205,000 volumes, including micro
holdings, is housed in the modern Jacob Burns Law Library Building,
ing Stockton Hall on the south side. This facility comprises nine floor and



evels with about 49,000 square feet of floor space. Its shelf capacity accommodates over 185,000 volumes; with supplementary shelving in Stockton Hall, a small branch of the *Law Review* in Bacon Hall, and substantial storage space in Lisner Hall, the library provides space for almost 300,000 volumes. Seating for more than 500 readers is provided in four reading rooms, lounge areas, carrels, enclosed study cubicles, semi-private reading alcoves, and seminar rooms.

The collections comprise a comprehensive working library of Anglo-American law, with supplementary material in related disciplines (such as business, finance, labor relations, sociology, criminology, political science, biography, foreign affairs, and others). Special areas are maintained for collections in tax law, labor law, patent-trademark-copyright law, international law, and foreign and comparative law. Included in the collections are the appellate decisions of all states courts and decisions of the federal courts, with comprehensive collections of English and Canadian court decisions; the currently annotated statutes of the 50 states; all federal statutes; English and Canadian statutes; selected statutes of other nations; and an extensive periodical collection, kept current by more than 1,100 subscriptions, covering virtually all American legal periodicals and most of those published in English throughout the world. The library is strong in its treatise holdings, administrative and regulatory materials, and Congressional coverage. The growing international law holdings include collections of United Nations and European Economic Community printed material, all current material from the International Labor Organization, and current and retrospective collections of international treaties. A large portion of the holdings of the former library of the Carnegie Endowment for International Peace, acquired by the University in 1950, is in the Law Library. A LEXIS terminal, providing computer-assisted research capability, is available to students and faculty.

The Juris Doctor Degree Program

ENTRANCE REQUIREMENTS

For information on "Application for Admission" to the Juris Doctor degree program, see page 28. Admission to candidacy for the degree of Juris Doctor requires a Bachelor of Arts or equivalent degree from an accredited college or university, a satisfactory quality of work, and an acceptable distribution of courses. Any substantial number of hours taken on a pass-fail or other ungraded basis may be seriously detrimental to an applicant's chances for admission. Eligibility is based on personal and scholastic records and on the results of the Law School Admission Test. No applicant will be acceptable in transfer who is ineligible to return in good standing to a previously attended law school. From the applicants, a selection is made by the Committee on Admissions.

Information concerning the Law School Admission Test may be obtained from the Dean of the National Law Center or from the Educational Testing Service, 20 Nassau Street, Princeton, N.J. 08540; or 1947 Center Street, Berkeley, Calif. 94704. The test is administered at various centers in the United States. Testing dates are usually in October, December, February, April, and

July. Completed application forms and fees must be received by the Educ
Testing Service at least two weeks before the date of the test. It is not
sary that formal application for admission be made prior to taking the te

ADVANCED STANDING

In unusual circumstances, advanced standing toward the degree of Juris D
may be granted for work of high quality successfully completed in othe
schools which are members of the Association of American Law Schoo
are approved by the American Bar Association. Transferred credits wi
be recognized in excess of those which might be earned in a similar peri
the National Law Center.

Advanced standing will not be granted for law work already counted to
the Bachelor of Arts or other pre-legal degree.

TUITION DEPOSIT

Every student admitted to the National Law Center as a candidate for th
gree of Juris Doctor must submit a tuition deposit ($100 initially plus
later) after receipt of notification of acceptance. This deposit is credited to
tuition.

PROFILE OF THE CLASS ENTERING IN THE FALL SEMESTER 1977–78

A first-year class of approximately 400 students was selected from more
5,500 applicants from 700 colleges and universities. Applications were rec
from every state in the union. Thirty-seven per cent of the first-year class
women.

The following colleges and universities are each represented by three or m
members of the first-year class: American University, Boston University, B
deis University, Brown University, Bucknell University, Catholic Universit
America, City University of New York (Brooklyn College and Queens Colle
Colgate University, Columbia University, Cornell University, Dartmouth
lege, Dickinson College, Duke University, Emory University, Fordham Un
sity, Franklin and Marshall College, George Washington University, Geo
town University, Hamilton College, Harvard University, Haverford Colle
Johns Hopkins University, Marquette University, Miami University, Mich
State University, Northwestern University, Oberlin College, Ohio State Uni
sity, Pennsylvania State University, Princeton University, Rutgers Univer
Smith College, Stanford University, State University of New York at Alba
State University of New York at Binghamton, State University of New Yor
Buffalo, Syracuse University, Temple University, Trinity College (Connecti
Tufts University, Tulane University, University of California, Berkeley, U
versity of Chicago, University of Connecticut, University of Denver, Univer
of Florida, University of Hawaii, University of Illinois, University of Mary
University of Michigan, University of North Carolina, University of Not
Dame, University of Pennsylvania, University of Pittsburgh, University
Rochester, University of Texas, University of Utah, University of Virgi
University of Wisconsin, U.S. Military Academy, U.S. Naval Academy, Vas
College, Washington University, Wellesley College, Wesleyan University, W
liams College, Yale University.

THE CURRICULUM

The curriculum for the degree of Juris Doctor at the National Law Center offers the candidate one of the largest and most varied selections of courses in the country. First-year students are required to take courses entitled Civil Procedure; Constitutional Law; Contracts; Criminal Law and Procedure; Legal Research, Writing, and Professional Responsibility and Ethics; Property; and Torts. These courses give students the basis upon which all further legal study is built. In the second and third years of study, students must take Evidence and fulfill a two-credit legal writing requirement. Beyond these requirements the students are free to choose from the many course and project offerings. The Law Center prides itself on allowing students freedom to design their own program of study.

The curriculum is organized so that students may begin the study of law for the Juris Doctor degree only at the start of the fall semester. Transfer students may enter at the start of the spring semester also.

Day Division

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	2
Torts	4	Property	4
Criminal Law and Procedure	4	Constitutional Law	4
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	4
Total semester hours	14	Total semester hours	14

Second Year

FALL SEMESTER		SPRING SEMESTER	
Elective	14	Evidence	4
		Elective	10
Total semester hours	14	Total semester hours	14

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	12	Elective	14
*Legal writing requirement	2		
Total semester hours	14	Total semester hours	14

*The legal writing requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a course which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*.

Evening Division

First Year

FALL SEMESTER		SPRING SEMESTER	
Contracts I	4	Contracts II	4
Torts	4	Criminal Law and Procedure	4
Legal Research, Writing, and Professional Responsibility and Ethics	2	Civil Procedure	2
Total semester hours	10	Total semester hours	10

Second Year

FALL SEMESTER		SPRING SEMESTER	
Property	4	Constitutional Law	4
Elective	6	Elective	6
Total semester hours	10	Total semester hours	10

Third Year

FALL SEMESTER		SPRING SEMESTER	
Elective	8	Evidence	4
*Legal writing requirement	2	Elective	6
Total semester hours	10	Total semester hours	10

Fourth Year

FALL SEMESTER		SPRING SEMESTER	
Elective	10	Elective	10
Total semester hours	10	Total semester hours	10

Summer Term or Ninth Semester

Elective	4

REQUIREMENTS FOR THE DEGREE

The student must have completed a residence period of three academic years (four years for evening students) and 84 semester hours of required and elective courses, with a cumulative average of at least 65. At least one academic year of residence and 28 semester hours are required of students admitted with

* This requirement may be satisfied by service on the *Law Review*, by satisfactory completion of a seminar which requires a research paper, or by satisfactory completion of Law 344, *Legal Writing*

dvanced standing. The work of the final semester or summer session must be completed while in residence at the National Law Center. Credits allowed for dvanced standing are not included in computing the average required for raduation.

Graduation Requirements.—See page 43 for a statement of the graduation equirements.

esidence

andidates for the Juris Doctor degree must complete a residence period of hree academic years. Attendance in the day division for the fall and spring emesters constitutes residence for an academic year; similar attendance in the vening division constitutes residence for three-fourths of an academic year. onsequently, a day student must attend six semesters to meet residence re-uirements; an evening student must attend eight. Students authorized to take hedules of less than 10 hours in the day division or less than six hours in the vening division receive residence credit on a proportional basis. Students who ttend the summer sessions receive fractional residence credit.

HONORS

The degree of Juris Doctor "With Highest Honors" is awarded to those stu-nts, not exceeding three per cent of the graduating class, who have obtained e highest cumulative averages of at least 85 or better.



The degree of Juris Doctor "With High Honors" is awarded to those student with the highest cumulative averages of 80 or better. The number of student receiving degrees "With High Honors," when added to the total number o students receiving degrees "With Highest Honors," may not exceed 10 per cen of the graduating class.

The degree of Juris Doctor "With Honors" is awarded to those students wi the highest cumulative averages of 75 or better. The number of students re ceiving degrees "With Honors," when added to the total number of student receiving degrees "With High Honors," and "With Highest Honors," may no exceed 40 per cent of the graduating class.

ORDER OF THE COIF

The Order of the Coif, a national legal honor society, aims "to foster a spir of careful study and to mark in a fitting manner those who have attained high grade of scholarship." The George Washington University Chapter wa established in 1926. Members are elected each year from the highest-rankin 10 per cent of the graduating Juris Doctor candidates.

PUBLICATIONS

The *George Washington Law Review*, published five times a year, is edited and managed by the students of the National Law Center. The *Law Review* is known for its emphasis on federal and public law; however, it is also de voted to research in other important legal areas. The staff of the *Law Review* is selected on the basis of a writing competition and on the basis of grades. The editorial board is selected from those students who have successfully com pleted the first year of *Review* work. Students receive 4 semester hours of academic credit for the two-year program.

The *Journal of International Law and Economics*, managed and edited by law students, is a biannual publication of the Law Center. It presents articles



commentaries on public and private international financial development, comparative law, and international law. The staff of the *Journal* is selected through a writing competition, and students earn academic credit for their work.

MOOT COURT

The Van Vleck Appellate Case Club provides realistic training in appellate oral advocacy for students in the National Law Center. Each year two competitions are held: the upperclass competition is held in the fall and the first-year competition is held in the spring.

LAW CENTER ORGANIZATIONS

Black America Law Student Association (BALSA)

The Black America Law Student Association is a national Black law students organization which has chapters at some 80 law schools. BALSA sponsors law speakers and various programs.

International Law Society

The International Law Society is an organization of students interested in the practice of international law. The Society sponsors speakers and various programs.

Movimiento Legal Latino

A national Latino law students organization which has chapters at various law schools, Movimiento Legal Latino sponsors law speakers and various programs.

Law Fraternities and Sororities

The chapters of Beta Kappa Pi, Delta Theta Phi, Phi Alpha Delta, and Phi Delta Phi at the National Law Center sponsor speakers and various social occasions.

Law Students Civil Rights Research Council (LSCRRC)

The Law Students Civil Rights Research Council is a national organization of law students concerned with the legal problems of civil rights. LSCRRC offers practical law projects for which students may receive academic credit.

National Lawyers Guild

The George Washington Chapter of the National Lawyers Guild is designed to bring together those lawyers committed to broad issues of social reform.

Student Patent Law Association (SPLA)

The Student Patent Law Association, an organization of students interested in patent and related law, conducts an extensive speakers program as well as various social events.



Student Bar Association

The Student Bar Association is the law student governing body, responsible for allocating funds among the various student organizations. It also conducts a speaker program for the law school. All members of the student body are members of the Student Bar Association.

Women's Rights Committee (WRC)

The Women's Rights Committee is primarily interested in the place of women in law schools and in the legal profession. WRC conducts seminars and sponsors speakers.

Joint Juris Doctor—Master's Degree Program

In certain instances, arrangements may be made for students to work concurrently toward both the Juris Doctor degree in the National Law Center and a Master's degree in some fields in the University's Graduate School of Arts and Sciences, School of Government and Business Administration, or School of

ublic and International Affairs. Fields in which this program is available in- ude Business Administration, Economics, International Affairs, Political ience, Public Administration, and Public Affairs. Students must be admitted en to the National Law Center and, separately, to the School which will nfer the Master's degree, and must meet all requirements in each degree pro- gram. It is possible for a student to complete work for both degree programs ithin four years.

Master's and Doctoral Programs

THE ADMINISTRATION OF JUSTICE under law is a matter so vast and complex hat some who hold the Bachelor of Laws or Juris Doctor degree feel the need or further study. The Master's and doctoral programs give students the op- portunity to broaden and deepen their understanding of the law.

The Master of Laws candidate may follow a program of general study or oncentrate in one of the specialized areas listed below. Courses in each of hese areas are included in the 401–600 series. Graduates who complete their ork in one of these areas may have the field of specialization noted on their iplomas.

Administrative Law: Economic Regulation
Corporation Law
Environmental Law
Government Procurement Law
International and Comparative Law
Labor Law
Land Use Management and Control
Law and Poverty
Law, Psychiatry, and Criminology
Law, Science, and Technology
Patent and Trade Regulation Law
Taxation
Urban Legal Studies

Programs leading to the degree of Doctor of Juridical Science offer a limited umber of unusually talented advanced students, who have already earned the laster of Laws degree, the opportunity to concentrate on research and writing n a specific area of interest to the legal profession.

MASTER OF LAWS

trance Requirements

A Bachelor of Laws, Juris Doctor, or equivalent degree from a law school hich is a member of the Association of American Law Schools or is ap- roved by the American Bar Association is required. The applicant must have emonstrated a high degree of academic excellence. Advanced standing is not ranted for credits earned while a candidate for the first degree in law or for redits earned at other law schools.

Degree Requirements

The student must complete a residence period of not less than two semesters which should be continuous. All requirements for the degree must be completed in this Law Center and in a period not exceeding three years from the time of initial graduate registration, unless an extension is granted in writing by the Dean. The student must complete 24 semester hours of courses and writing projects with acceptable grades. For all courses taken within the Law Center a student must attain the grade of 65 or above. For approved courses taken outside the Law Center, the grade of either *CR* (Credit) or *NC* (No Credit) is assigned. To receive the grade of *CR* (Credit) in a course taken in other graduate divisions of this University, a student is required to attain the grade of *B* or better. To receive the grade of *CR* (Credit) in a course taken at Georgetown University through the Consortium of Universities of the Washington Metropolitan Area, Inc., a student is required to attain the grade of *C* or better. A minimum cumulative average of 78 is required at all times for all LL.M. candidates admitted or readmitted after February 1976, or completing their degree requirements after February 1979. For candidates registered prior to February 1976, and continuously registered since, who receive their degree on or before February 1979, the minimum cumulative average is 75. The student is expected to include Law 599–600 *Thesis* in the 24-semester hour requirement for the degree (for exception, see "Master's Thesis," below).

Candidates for the degree in a selected field of specialization must complete a minimum of 12 of the required 24 semester hours in courses and writing projects related to the selected field. Each Master of Laws program of study may include a limited number of courses numbered in the 300 series, with the approval of the Dean.

The only credit hours that may be applied to any Post-J.D. degree are those completed while a duly enrolled candidate for that specific degree, with the following exceptions: (1) an unclassified student who has been admitted with the specific right to convert to degree status at the end of a specified number of hours, and (2) S.J.D. candidates who have fulfilled the 8-hour course requirement as unclassified students.

MASTER'S THESIS

Each candidate for the degree of Master of Laws is expected to write a Master's thesis (Law 599–600) under the supervision of a full-time member of the faculty of the National Law Center. Four hours of credit will be granted upon successful completion of the thesis. The purpose of this requirement is to demonstrate the ability of the student to perform research in a special area of the law and to produce a scholarly paper containing the results of this research. The thesis is expected to be of substantially the same quality as a Law Review article. The Dean may waive the thesis requirement upon written request of the student, submitted no later than the beginning of the *final semester or summer session* before the student's graduation, provided the student has demonstrated research and writing ability by taking a minimum of 6 semester hours of course work at the National Law Center designated "Research Paper." No thesis waiver is granted for candidates for the degree of Master of Laws with specializations in international law or government procurement law.

The thesis in its final form must be presented to the adviser no later than the date specified in the Calendar. Two complete copies are required. It is the responsibility of the candidate to obtain from the Post-J.D. Programs Office a printed copy of the regulations governing the styling and reproduction of theses. The mandatory thesis binding fee of $10 must be paid at the time of registration for the last semester's work.

Accepted theses become the property of the University and are placed in the University Library and the Law Library, where the duplicate copies are bound and made available for circulation.

Honors

The degree of Master of Laws "With Highest Honors" is awarded students who attain a minimum cumulative average of 85.

Graduate Courses in Other Departments

Master of Laws candidates may be permitted to take graduate courses related to their fields of interest in other departments of this University. A maximum of 6 semester hours will be credited toward the degree for such courses; however, credit will be granted only if the courses are given on campus. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses. Courses numbered 101–200 may be taken for graduate credit only if the student receives the approval of the instructor at the time of registration and does additional work, as prescribed by the department offering the course.

Consortium of Universities of the Washington Metropolitan Area, Inc.

A candidate for the Master of Laws degree may take graduate courses at Georgetown University Law Center through the Consortium of Universities of the Washington Metropolitan Area, Inc. A maximum of 6 semester hours of such courses may be credited toward the degree. Permission to take Consortium courses must be granted by the Dean, the Registrar, and the instructor offering the course. The grade of *CR* (Credit) or *NC* (No Credit) will be recorded for such courses. To receive the grade of *CR* a student must attain a numerical grade of 80 or higher.

DOCTOR OF JURIDICAL SCIENCE

Entrance Requirements

Admission to candidacy for the degree of Doctor of Juridical Science requires a Bachelor of Arts or equivalent degree from an approved college or university, a Bachelor of Laws, Juris Doctor, or equivalent degree, earned with high rank from a law school which is a member of the Association of American Law Schools or is approved by the American Bar Association; a Master of Laws degree with high academic standing; outstanding capacity for scholarly work in the field of law; and faculty approval of the applicant's dissertation topic. Applicants must also demonstrate their writing ability by submitting the Master's thesis or a copy of one or more papers or articles which the applicant has written. Following consultation with the Dean, the applicant must obtain a faculty adviser, to be designated "committee chairman," from the regular,

full-time faculty; reach agreement on the acceptability of the proposed to for the dissertation; and submit a detailed outline for the adviser's appro indicating by chapter and division within chapter the exact scope of t project. There should be a bibliography for each chapter, listing books, r ports, cases, and law review articles to be considered. Although the outl cannot predict every detail of the subsequent research, it must be sufficient definite to afford the Graduate Board a basis for evaluation.

Once the outline is approved, the applicant's "committee" is expanded three members; this consultative committee must recommend the acceptan of the applicant to the full Graduate Board. The Board then acts upon recommendation and may either accept or reject the applicant as an S.J.D candidate. In no instance will any applicant be admitted to degree can dacy prior to the above procedures; however, the applicant may be registered an Unclassified Student for purposes of course work requirements (see below Approval for degree candidacy must be received within one year of the a pointment of an adviser unless a written extension is granted by the Dean.

Degree Requirements

The candidate must complete (1) a residence period of not less than one ac demic year; (2) a course of study and research—designated by the consulta tive committee and approved by the Graduate Board—of no less than t semester hours including *Jurisprudence*, unless previously taken; and (3) a acceptable dissertation. The dissertation must be submitted no later than three years from the date of admission to candidacy for the S.J.D. degree. The applicant who proposes to write on a comparative law topic must have a reading knowledge of the language in which the relevant materials are to be found. When the dissertation is submitted, the consultative committee will set the date for an oral examination. This examination is conducted by the con sultative committee and such other members of the faculty and qualified ex perts as are selected by the Graduate Board.

No later than the date specified in the Calendar (see page 5), the candidate must submit to the Dean two complete copies of the dissertation and two copies of an abstract (not to exceed 600 words) of his dissertation.

Printed copies of detailed regulations regarding the form and reproduction of the dissertation and preparation of the abstract are available in the Office of the Dean. To be acceptable the dissertation must, in the opinion of the examining committee, constitute a substantial contribution to the field of law concerned and be suitable for publication. Additional information will be supplied by the Dean. Accepted dissertations become the property of the University and are placed in the University Library and the Law Library, where the duplicate copies are bound and made available for circulation.

Degree Programs for International Students

THE NATIONAL LAW CENTER has several programs of study available to students trained in law outside the United States. These programs fall into two general categories: (1) those directed toward preparing students for a bar examina-



...ars in an American jurisdiction and (2) those that enable students to return ... their countries with a more thorough understanding of some aspects of ...erican law.

A student with a degree from a foreign law school who has met the extremely ...petitive admissions criteria will be admitted to the Center as a candidate ... the Master of Comparative Law (Foreign Practice) (M.Comp.L. [For. ...c.]) or Master of Comparative Law (American Practice) (M.Comp.L. [Am. ...c.]) degree.

To prepare for admission to the bar of an American jurisdiction, the student ...y apply for either the Juris Doctor or the Master of Comparative Law ...erican Practice) degree. The J.D. degree requires 84 semester hours of ...rk in law school (credit is given for work in a foreign law school only in ex...ptional circumstances) and will qualify the student to take most U.S. bar ...minations. ***Students are cautioned to ascertain the requirements of the bar ... which they intend to qualify prior to selection of their law school programs.***

Foreign students planning to return to their home countries may undertake a ...ogram leading to the degree of Master of Comparative Law (Foreign Prac... This degree program enables the student to gain a broader comprehension ... the American legal system by taking basic courses in the Law Center. How...er, it is not intended to qualify a student to take a U.S. bar examination.

ADMISSION PROCEDURE

...plication must be received from *foreign applicants* no later than June 1 ... the fall semester (March 1 for candidates for the Juris Doctor degree), ...ovember 1 for the spring semester, and March 1 for the summer sessions.

...quired Records

...plicants must request all educational institutions attended to send directly ... the Dean official credentials listing subjects studied, grades received, exam...tions taken, and degrees received. Original diplomas, certificates, and ...anscripts from secondary schools and all colleges and universities attended

are required, but in exceptional cases certified copies will be accepted. Record of state examinations and certificates are also needed. All records become the property of the University and *cannot* be returned.

Language Test

Students whose native tongue is not English are required to take the *Test of English as a Foreign Language* and attain as an absolute minimum the score of 550 to be considered for admission to the National Law Center. This is a mandatory requirement. Students are responsible for making arrangements for taking the test and should address inquiries to TOEFL, Educational Testing Service, Princeton, New Jersey 08540, U.S.A. The completed application form should be returned to the Testing Service at Princeton well in advance of the beginning of the semester for which the applicant seeks admission. The test score, which should be remitted with the application, entitles the student to have the test score sent to three different institutions. Registration for the *Test of English as a Foreign Language* does *not* constitute application for admission to George Washington University.

The Bulletin of Information, obtainable without charge, contains a description of the test as well as rules regarding application, fees, reports, and the conduct of the test; lists of examination centers; examination dates; and an application blank. On the application for the test, the student should specify that the scores be sent to the Dean's Office.

ENTRANCE REQUIREMENTS

For the Degree of Juris Doctor.—Entrance requirements for foreign students are the same as those stated on page 11, except that advanced standing is rarely granted for study in foreign law schools.

For the Degrees of Master of Comparative Law (Foreign Practice) and Master of Comparative Law (American Practice).—The entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo, and graduation in law with high academic standing from a recognized foreign university.

For the Degree of Master of Laws.—A foreign student will only be considered for admission to the Master of Laws program if he or she has a juris doctor or post-juris doctor degree in law with high academic standing from an American university.

For the Degree of Doctor of Juridical Science.—The usual entrance requirements are the successful completion of and graduation from a course in arts, philosophy, letters, or sciences, equivalent to graduation from a gymnasium, lycee, or liceo; graduation in law from a recognized foreign university; outstanding capacity for scholarly work in the field of law; and a Master of Laws degree with high academic standing from an American university.

DEGREE REQUIREMENTS

Juris Doctor, Master of Laws, Masters of Comparative Law, and Doctor of Juridical Science.—Degree requirements for foreign students are the same as those stated on pages 14–15, 20, and 22.

Master of Comparative Law (Foreign Practice).—The student must complete
residence period of not less than two semesters, which should be continuous.
requirements for the degree must be completed in a period not exceeding
ree years from the time of registration for the degree. The student must com-
e satisfactorily 24 semester hours of approved courses of the Center, or of
ch other departments of the University as the faculty of the Center shall ap-
ve, and must maintain a cumulative average of at least 55. A cumulative
erage of 65 is required for those admitted after the spring semester 1977.
Master of Comparative Law (American Practice).—The requirements for
degree are the same as those for the degree of Master of Comparative Law
oreign Practice) except that this degree requires 28 semester hours of course
ork with a cumulative average of at least 65.

Unclassified Students

WO TYPES OF STUDENTS may be admitted to the National Law Center as Un-
assified Students, in accordance with the following regulations:
1. A candidate for a Bachelor of Laws or Juris Doctor degree with an above-
erage record at another law school which is a member of the Association of
merican Law Schools or is approved by the American Bar Association, may
the discretion of the Dean, be admitted as an Unclassified Student to earn
edits for transfer to the other law schools. Such students are normally ad-
ted only to the summer sessions. They are admitted to the fall or spring
mester only in unusual circumstances.
2. Graduates of law schools which are members of the Association of Amer-
an Law Schools or are approved by the American Bar Association who wish
take advanced courses without pursuing degree programs may be admitted as
Unclassified Students.
Unclassified Students participate in the work of the course, take examina-
s, and have their grades recorded. Credit for work earned as an Unclassi-
d Student may not be applied to satisfy the requirements for a degree pro-
m unless express written approval is granted by the Dean at the time of
mission.

Continuing Legal Education

EMBERS OF THE BAR wishing to keep abreast of current developments in the
w may register for any of the courses in the National Law Center on a non-
dit basis as Continuing Legal Education students. Such students do not take
aminations in courses and no grades are recorded for their work.
A simplified admission and registration procedure is used and must be com-
ted on or before the last day of regular registration for the appropriate
mester. Continuing Legal Education students pay only the tuition fee on the
mester-hour basis. They may not participate in student activities or benefit
m the medical privileges of the University. (Continuing Legal Education
gistrations are subject to cancellation if courses are filled by regularly reg-
ered students.)

GENERAL INFORMATION

E NATIONAL LAW CENTER has an enrollment of about 1,700 for the J.D. and st-J.D. degree programs. Approximately 1,000 students are enrolled in the ll-time day division for the J.D. degree and 400 are enrolled in the part-time ening division. Three hundred students, many from abroad, are enrolled in e Post-J.D. degree programs.

DAY AND EVENING CLASSES

y classes meet in the mornings in 50-minute periods and in the afternoons in minute periods and also in sessions of two 50-minute periods, Monday rough Friday. Trial Practice Court and certain other courses meet for two- f periods on Saturday mornings.

Evening classes meet from 5:50 to 7:40 p.m., Monday through Friday. A ur-credit course, e.g., Evidence, meets two evenings a week; a three-credit rse, e.g., Administrative Law, meets two evenings a week for one-half the mester and one evening for the other half; a two-credit course, e.g., Contracts meets one evening a week. The evening division conforms to the standards the day division, the full-time faculty participating in the instruction.

Examinations for both day and evening classes may be given in the after- on only. Examinations for day students may be given in the evening.

SUMMER TERM

term of two sessions, with day and evening classes, is offered in the summer. dents may register for either or both sessions. *No beginning students are mitted to the Juris Doctor program in the summer term.*

The summer term is shorter than a semester of the academic year, and, as a nsequence, a student must attend two and one-half summer terms to receive dence credit for one academic year or attend one and one-half summer ms to receive residence credit for a semester.

A maximum of 6 semester hours may be taken each session by day students. y students receive four-tenths of a semester of residence credit for each ses- n of the summer term in which they are registered for 3 or more semester urs. A maximum of 4 semester hours may be taken each session by evening dents. Evening students receive three-tenths of a semester of residence credit r each session of the summer term in which they are registered for 2 or more mester hours.

Admission

APPLICANTS ARE URGED to submit application forms and complete credent
well in advance of the semester for which they seek admission. In the selec
process, there is no discrimination against any applicant because of sex, r
color, religion, handicap, or national origin. An application fee of $25 for a
gree candidate ($5 for an unclassified student) must accompany the applica

Forms for application for admission or readmission are available at
should be returned to the Office of Admissions of the National Law Cen
George Washington University, Washington, D.C. 20052.

For further details concerning students from foreign institutions, see p
22–25.

APPLICATION FOR ADMISSION

Juris Doctor Program.—Beginning students are admitted only at the start
the fall semester.

The applicant should register with the Law School Data Assembly Ser
(LSDAS) by completing and mailing the registration form supplied with e
application blank. A transcript from each college or university attended sho
then be sent directly to LSDAS, Educational Testing Service, Box 944, Pro
ton, New Jersey 08540. No transcript should be sent to the National L
Center. The LSDAS will analyze the transcript and send a copy to this
school and others designated on the registration form. If the transcript w
has been forwarded to LSDAS does not show evidence of receipt of a Bac
lor's degree, the applicant will be asked, upon acceptance, to submit a fi
transcript directly to the National Law Center.

To provide time for the evaluation of credentials of beginning students
papers, including the Law School Admission Test score, should be receive
the National Law Center before March 1. This means that the October or
cember Law School Admission Test should be taken (see "Entrance Requ
ments," page 11.

All papers of transfer students should be received by the Office of the D
no later than May 1 for the fall semester, December 1 for the spring semes
and one month prior to registration for the summer session for which appl
tion is made.

For additional information, see the official *Pre-Law Handbook*, 1978–19
edition, available in October, 1978, and prepared by the Law School Admiss
Council and the Association of American Law Schools. This book inclu
material on the law and lawyers, pre-law preparation, applying to law schools
and the study of law, together with individualized information on most Amer
can law schools. It may be obtained at college bookstores or ordered from
Educational Testing Service, Princeton, New Jersey 08540.

Master's and Doctoral Programs.—Students are admitted at the beginning
the fall semester, the spring semester, or any of the summer sessions.

Application for admission, together with all required credentials, must
received by July 1 for the fall semester, December 1 for the spring seme
ter, and one month prior to registration for the summer session for which ap
plication is made.

Unclassified Students.—Lawyers who wish to take graduate courses

mitted at the beginning of the fall semester, the spring semester, or any of summer sessions. Students who wish to earn credits for transfer toward a chelor of Laws or Juris Doctor degree at another institution may be admitted ne summer sessions if they are students in good standing at an accredited school and have shown unusual ability in their law studies; they are ad- ted to the fall or spring semester only in unusual circumstances.

Application for admission, with required credentials, for a student who nes to earn credits for transfer toward a Bachelor of Laws or Juris Doctor gree at another law school (see page 25), should be received at the Office of missions of the National Law Center at least one month prior to the first day registration for the semester or summer session for which application is ade.

2. Application for admission, with required credentials, for lawyers who wish take graduate courses (see page 25), should be received at the Office of Ad- ssions of the National Law Center by July 1 for the fall semester, December for the spring semester, and one month prior to registration for the summer sion for which application is made.

READMISSION

student who was previously registered but did not attend during the most cent semester (summer term excluded) should file an application for read- ssion. Closing dates for readmission are the same as those for admission e "Application for Admission," page 28).

If the student has attended one or more higher institutions during his ab- nce from the University or if he applies as a degree candidate and was pre- ously a nondegree student, he must have complete, official transcripts sent to e Dean.



Registration

BEFORE ATTENDING CLASSES each student must register in person. No stu
will be registered until proper credentials have been filed and approved
"Admission").

No registration is accepted for less than a semester or one summer sessio

A student may not register concurrently in George Washington Univer
and another institution. Registration in more than one college, school, or
sion of the University requires the written permission of the deans concer
prior to registration.

ELIGIBILITY FOR REGISTRATION

A student who is suspended or whose record is not clear for any reason is
eligible to register.

New Student.—Upon receipt of a *final letter* of admission a new stude
eligible for registration on the stated days of registration.

Readmitted Student.—A student previously registered who was not regist
for courses during the preceding semester or summer session must apply
and receive a letter of readmission (see "Readmission," above) before bec
ing eligible for registration.

DATES AND PLACE OF REGISTRATION

Registration is held in Stockton Hall, 720 Twentieth Street, N.W., during
following periods: *fall semester,* August 17 and 18, *spring semester,* Jan
4 and 5.

A late-registration fee of $15 is charged each student who is permitted
register after the regular registration days.

Registration may be changed only with the permission of the Dean.



Fees and Financial Regulations

THE FOLLOWING FEES AND FINANCIAL REGULATIONS were adopted for the academic year 1978–79, and summer 1978. (See page 32 for projected tuition and fee increases for 1979–81.)

Tuition Fees

For the Juris Doctor's Degree:

Full-time program (11 or more hours*), each semester	$1,800.00
Part-time program, for each semester hour	
For students enrolled in 1975–76 for the J.D. degree who obtain the degree no later than May 1979	110.00
For all other students	145.00
For all other students (except Doctor of Juridical Science) including Master's degrees and Continuing Legal Education:	
Full-time program (11 or more hours*), each semester	1,800.00
Part-time program, for each semester hour	145.00
Doctor of Juridicial Science,† including the final examination	3,700.00
Summer Sessions 1978:	
For students enrolled in 1975–76 for the J.D. degree who obtain the degree no later than May 1979	105.00
For all other students	145.00

University Center Fee (charged all students registered on campus)

For students registered for 11 or more semester hours:	
Each semester	50.50
For students registered for less than 11 semester hours in a semester:	
For each semester hour for which the student registers	4.75
For students maintaining "continuous registration" status:	
Each semester	4.75

Graduation Fees

For Doctor, Master's, Doctor's degrees	25.00
Fee for binding Master's Thesis	15.00

Special Fees

Application fee (degree candidate), nonrefundable	25.00
Application fee (unclassified student), nonrefundable	5.00
Application fee for room reservation, nonrefundable	100.00
Advance deposit fee charged each student admitted to J.D. degree candidacy (payable in two installments—$100, nonrefundable, by a date specified in the letter of admission, $350 by June 1)	450.00
Late registration fee, for failure to register within the designated period	15.00

* With the prior permission of the Dean, a J.D. degree candidate may take more than 14 semester hours after the first year of study.

† The tuition fee is to be paid at the rate of $925.00 a semester for four successive semesters, exclusive of the summer term or terms. No "continuous registration" fee will be charged if a third year is needed for completion of the degree requirements. If the Faculty should approve an extension of time, the student must maintain continuous registration and pay the continuous registration fee.

Continuous registration fee, for post-J.D. students, to maintain "continuous registration" during any semester of absence from the University or after completion of tuition requirements.* Due and payable on the official days of registration; nonrefundable .....
Late-payment fee, charged for failure to make payments when due (see "Payment of Fees," below) .....
Replacement of lost or stolen picture identification card .....
Financial reinstatement fee, for reinstatement after financial encumbrance for nonpayment of fees (see "Payment of Fees," below) .....
Returned check fee, charged a student whose check is returned because of insufficient funds or for any other reason .....
Transcript fee, for each transcript of record.....

Registration on campus in the University entitles each student to the follo privileges: the services of the Student and Alumni Career Services Office; th of the University Library; gymnasium privileges; admission to all athletic tests, unless otherwise specified; subscription to the *University Hatchet*, student newspaper; admission to University debates; medical attention a scribed under Student Health Service. These privileges terminate and a dent is no longer in residence upon withdrawal or dismissal from the Unive

PROJECTED TUITION AND FEE INCREASES 1979–81

In order that students and their parents may plan more realistically, tuitio creases for the academic years 1979–80 and 1980–81 have been estimate follows:

†Increase by year (full-time students):
1979–80 .....
1980–81 .....

Increase by semester hour (part-time students):
1979–80 .....
1980–81 .....

The University Center fee will be increased for the 1979 summer ses and the academic year 1979–80. For students taking 11 or more semester h the fee will be $55.50 per semester. Students taking less than 11 semester h will pay $5.25 per semester hour.

It is not possible to project future economic data with certainty. Th creases outlined above are merely estimates based on present circumsta and should in no way be interpreted as fixed limits on tuition increases. University hopes to keep tuition increases as low as possible, but it is oblig to maintain a sound financial basis. Economic conditions in the recent particularly as they affect private educational institutions, have been extre variable, and significant increases in tuition in excess of the above limits be required.

PAYMENT OF FEES

No student is permitted to complete registration or attend classes until charges are paid. Tuition and fees for each semester are due and payable full at the Office of the Cashier at the time of each registration. Checks

* The continuous registration fee does not apply toward residence requirements for the degree. S a student add a course after paying a continuous registration fee for the term, the fee will be ap toward tuition charges. This fee does not apply to students granted military leave.

† These yearly increases are also projected for the total fee for work leading to the degree of Do of Juridical Science.

postal money orders should be made out to George Washington University with student identification number shown in upper left hand corner.

The Student Accounts Office has responsibility for billing and maintaining student accounts for tuition, various fees, and room and board charges. A student registered for 6 semester hours or more may sign a deferred payment contract with the Student Accounts Office at the time of each registration permitting him to pay one-half of the total tuition and fees (except for fees payable in advance) at the time of registration and the remaining half on or before October 25, 1978 (for the fall semester), and March 7, 1979 (for the spring semester). Interest at the rate of 8 per cent per annum on the unpaid balance will be charged from the date of registration to the date payment is made.

Students receiving tuition assistance in the form of scholarships, government tuition contracts, or other forms of tuition awards are not permitted to sign deferred payment contracts unless the total tuition and fee charges exceed the value of the tuition awards by $750 or more. Under such circumstances the student may be permitted to pay one-half of the amount due from the student at the time of registration and to defer the balance by signing a deferred payment contract.

Students who fail to make any payment when due will be automatically charged a $15 late-payment fee and will be subject to the interest charge of 8 per cent per annum. Accounts which become 30 days past due will be financially encumbered. In the event a student's account is financially encumbered, the student forfeits his right to the use of deferred payment contracts in future semesters, and the Student Accounts Office will notify the Registrar to withhold grades, future registration privileges, transcripts, diplomas, and other academic information until the account is settled financially. Financial settlement will require payment in full of all amounts due the University in addition to a financial reinstatement fee of $35.

PREPAID AND DEFERRED PAYMENT PLANS

Several commercial programs for those who wish to pay for college on a monthly basis are available. Terms and conditions vary, but most provide a life insurance policy in the contract. For specific details and applications, address inquiries to the following:

1. Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
2. Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, Boston, Mass. 02100
3. The Tuition Plan, Inc., Concord, N.H. 03301

The University's Office of Student Financial Aid does not maintain a supply of applications for these various programs, but will be happy to provide guidance to students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedule must be made in person or in writing to the Dean. Withdrawal from

*Regulations covering withdrawal and refunds for the summer sessions are stated in the *Summer Session Schedule of Classes*.

courses is permitted after the midpoint of a semester only in extraordinary cumstances. Notification to an instructor is not an acceptable notice.

In authorized withdrawals and changes in schedule, cancellations of sem tuition charges and fees will be made in accordance with the following sch ule for the fall and spring semesters:

1. *Complete withdrawal* from the University:

FALL SEMESTER*

Withdrawal dated on or before August 25, 1978	90 per
Withdrawal dated August 28 to September 8, 1978	75 per
Withdrawal dated September 11 to September 22, 1978	50 per
Withdrawal dated after September 22, 1978	none

SPRING SEMESTER

Withdrawal dated on or before January 12, 1979	90 per
Withdrawal dated January 15 to January 26, 1979	75 per
Withdrawal dated January 29 to February 9, 1979	50 per
Withdrawal dated after February 9, 1979	none

2. For a *change in status from full-time to part-time student* or for *withdrawal by a part-time student*, the above schedule applies to the di ence in charges between the original program and the adjusted progr continuing in effect.
3. A student enrolled in a full-time program who drops or adds a course continues to be in a full-time program will have no financial adjustme of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester receive credits for current charges in accordance with the schedule complete withdrawal from the University (see No. 1, above). Payme made in excess of the nonrefundable balance will be refunded to the st dent. The nonrefundable balance will be maintained as a deferred cre for use by the student when he returns to the University (see "Milit Leave," page 44).
5. Regulations governing student withdrawals as they relate to residence h and food service charges are contained in the specific lease arrangement

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In no case will tuition be refunded or reduced because of absence from class

Payment applies only to the semester for which a registration charge is curred and will not be credited to another semester (exception: studen granted military leave, see page 44).

Authorization to withdraw and certification for work done will not be giv a student who does not have a clear financial record.

Students are encouraged to provide their own cash funds until they can mak banking arrangements in the community.

* No refund of the $100 deposit required of entering students is granted.



Financial Aid

THE NATIONAL LAW CENTER has been able in recent years to assist many students in obtaining the financial aid they require, through full or partial scholarships, various loan programs, part-time employment, or a combination of these kinds of assistance.

GRADUATE AND PROFESSIONAL SCHOOL FINANCIAL AID SERVICE

The National Law Center participates in the Graduate and Professional School Financial Aid Service (GAPSFAS), which provides an analysis of an applicant's financial needs. Entering students wishing to receive financial aid should request the materials from GAPSFAS, Education Testing Service, Box 944, Princeton, New Jersey 08540. The information provided by the applicant and the applicant's parents will be analyzed, and a copy of the report will be sent to the Law Center. In addition, students entering the National Law Center who desire to be considered for a scholarship must submit a letter to the Law Center by March 1 outlining their academic qualifications, their extracurricular activities, and their reasons for believing a scholarship award to them is justified.

Students needing financial assistance should file with GAPSFAS in time for their reports to be received at the Law Center as early as possible since the Committee on Student Financial Aid of the Center will begin making awards in March, and available funds are limited.

No awards will be made to an entering student until the admission process has been completed.

JURIS DOCTOR PROGRAM

Scholarships and Research Assistantships

Application and correspondence concerning scholarships and research a
tantships should be sent directly to the Dean. Unless otherwise specified, ap
cation and supporting credentials should be submitted no later than Marc
preceding the period for which the award is made.

Arent, Fox, Kintner, Plotkin & Kahn Scholarship (1973).—Scholarship
for needy law students from the Washington, D.C., area.

Mildred Gott Bryan Scholarship Fund (1965).—Partial scholarship aid
students in the National Law Center.

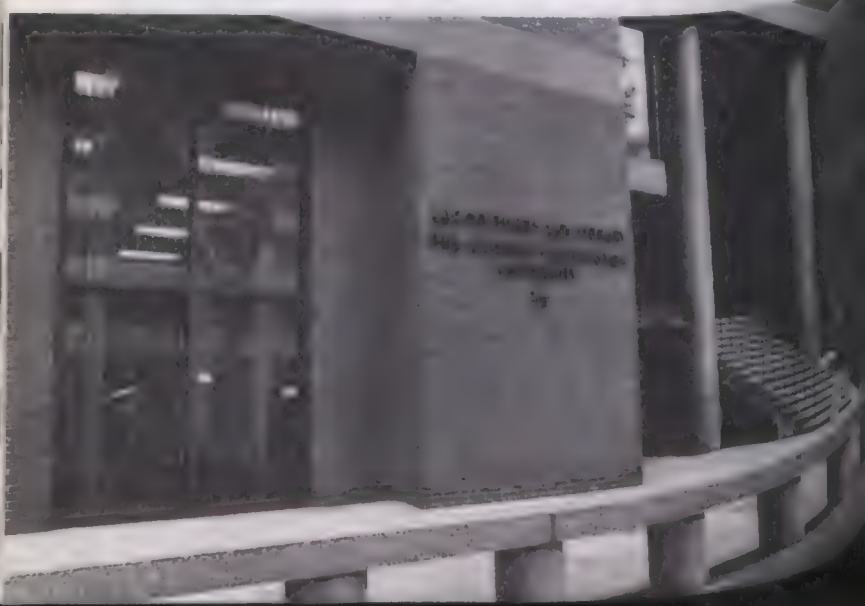
Charles Worthington Dorsey Memorial Scholarship (1947).—Memorial
Charles Worthington Dorsey, LL.B. 1881, LL.M. 1882. A full-tuition schol
ship for the course leading to the degree of Juris Doctor, awarded to a de
and promising graduate of this University with a Bachelor of Arts or equ
lent degree. Ordinarily this scholarship is awarded once every three years.

Honor Scholarships.—Two scholarships available each year to students en
ing upon full-time study. Each scholarship provides a cash award, in addi
to tuition aid, in an amount depending on need, for all three years. Th
scholarships are awarded on the basis of outstanding college records, both a
demic and extracurricular; Law School Admission Test scores; and need.
retain the scholarship for the second and third years, the candidates m
maintain a *B* average, both for each year and cumulative.

Minor Hudson Scholarship (1977).—Scholarship to support legal resea
by a Juris Doctor candidate in the field of public contracts.

Law Center Tuition Remission.—For Juris Doctor students, based on
nancial need.

Phi Delta Delta Scholarships (1959).—Zeta Chapter of Phi Delta Delta Le
Fraternity (International), provides tuition aid to a student in the second y
of the Juris Doctor program who excelled in scholastic achievement and serv
to the Center in the first year.



Vernon Romney Scholarship Fund (1977).—To provide a scholarship to some worthy student in the Law School.

Trustee Scholarships.—Scholarships awarded each year to entering full-time students, for tuition aid, in amounts depending on need. Candidates must have demonstrated qualities of leadership, in addition to scholastic attainment. To retain the scholarship, the successful candidate must maintain a *B* average, both for each year and cumulative. Application must be made to the Dean before March 1.

Tuition-aid scholarships are also available to continuing second- and third-year full-time students with demonstrated scholastic ability, on the basis of financial need and capacity for leadership. Application should be made to the Dean prior to June 1.

Frank S. Whitcomb Scholarship Fund (1971).—Bequest of Frank S. Whitcomb for the purpose of aiding and assisting worthy young men and women in securing a legal education.

Graduate Fellowship Information Center.—Students may also wish to visit the Graduate Fellowship Information Center (2025 H St., N.W.) for additional information on fellowships and grants.

Loan Funds

Through the generosity of friends of the University a number of loan funds are available. Among them are the Lyle T. Alverson Loan Fund; the Robert Ash Loan Fund; the George R. Beneman Loan Fund; the Morris and Gwendolyn Cafritz Foundation Minority Law Student Loan Fund; the Robert M. and Mary McConnel Cooper Loan Fund; the Robert McKinney Cooper Memorial Loan Fund; the J. Forrester Davison Loan Fund; the District of Columbia Bar Association Loan Fund; the J.W. Ehrlich Foundation Loan Fund; the Newell W. Ellison Loan Fund; the Harold L. and Violet George Foundation Loan Fund; the George Washington Law Association Loan Fund; the Morris Golub Loan Fund; the Jephson Educational Trust Loan Fund; the Law Association Loan Fund for the law classes of 1912, 1918, 1921, 1924, 1929, 1931, 1933, 1935, 1936, 1937, 1938, 1939, 1941, 1942, 1945, 1950, 1951, 1952, 1953, 1955, 1959, 1960, 1961, 1962, 1963, 1964, 1965; the Law School Loan Fund; the Oscar Lawler Memorial Loan Fund; the Horace L. Lohnes Memorial Assistance Fund; the Jessie B. Martin Loan Fund; the Robert N. Miller Loan Fund; the Joan Murphy Loan Fund; the Mike Pelekiri Loan Fund; the Phi Delta Delta Loan Fund; the W. Theodore Pierson Loan Fund; the Rockport Loan Fund; the Samuel L. Samuel Loan Fund; the H. William Tanaka Law Students Assistance Loan Fund; the Orville Hassler Walburn Memorial Loan Fund; the Ruth F. Wilson Loan Fund; and the Yadao and Kanemoto Loan Fund.

In addition, financial assistance is available through the Guaranteed Student Loan Program, National Direct Student Loans, the American Bar Association Loan Program, and other sources.

Application for financial assistance should be made in the Office of the Dean.

MASTER'S AND DOCTORAL PROGRAMS

Fellowships and Scholarships

Application should be made before March 1 preceding the period for which the award is made. The applicant should submit an application for admission

as a degree candidate and a personal letter applying for a fellowship to
Dean. The letter of application should contain complete biographical d
information as to experience in practice or teaching, and copies of or citati
to published legal writings, and such other information the student believes
be of assistance in the consideration of the application. Applicants sho
arrange for letters of recommendation to be sent from two members of th
law faculty directly to the Dean. The applicant's academic rank in class sho
be included either in the transcript of the law school or in the letters
recommendation.

Graduate Fellowship.—Sponsored by the Food and Drug Law Institute.
stipend of $10,000 will be available in 1978–79 to finance a fellowship in Fo
and Drug Law. The academic work under this Fellowship leads to receipt o
general, undesignated Masters degree or a designated Masters degree in A
ministrative Law: Economic Regulations or Patent and Trademark Law,
the satisfactory completion of 24 credit hours of approved work. A thesis
publishable quality will be a mandatory requirement for the degree, as well
a minimum two hours per semester of clinical work in food and drug practi
in the Law Center's clinical program under the supervision of a faculty
visor.

Teaching Fellowships.—Three or four fellowships available each year with
stipend of $8,000 plus tuition for an approved course of study leading to
advanced degree. Teaching fellowships are awarded for a term of two a
demic years. Fellows conduct the first-year course in Legal Research and Wr
ing and work with the students to improve their legal writing ability.
arrangement with the Dean, they may also be given the opportunity to tea
additional courses.

Richard Paul Momsen Scholarships for Brazilian Graduate Law Students.
Bequest of Richard Paul Momsen, LL.B. 1912. Awarded 1978–79 and alte
nate years, for the study of U.S. constitutional law and the law of patents
trademarks.

Prizes

Jacob Burns Prize.—Established by Jacob Burns, a law alumnus and Trust
of the University. A medal and $100 awarded annually to each of the re
members of the winning team in the upperclass Van Vleck Moot Court co
petition.

Ogden W. Fields Graduate Prize.—Fifty dollars awarded annually to a
graduate student who has demonstrated the highest overall proficiency in
course in labor law.

Charles Glover Prize.—Established by Charles Carroll Glover, Jr., an Hon
orary Trustee of the University, in memory of his great-grandfather, an illustri
ous member of the bar of the District of Columbia. Consists of selected law
books. Awarded annually to the student who has attained the highest average
grade in the third-year, full-time course.

Kappa Beta Pi Prize.—Awarded by Eta Alumnae Chapter to the law stu
dent who attains the highest average for the first year.

John Bell Larner Prize.—By bequest, a medal awarded annually to the
member of the graduating class who attains the highest average grade in the
entire course for the degree of Juris Doctor.

John Ordronaux Prizes.—By bequest, $75 awarded annually to the student who has attained the highest average grade in the first-year, full-time course; and $75 to the student who has attained the highest cumulative average grade at the end of the second-year, full-time course.

United States Law Week Award.—Presented to an outstanding senior law student.

Jennie Hassler Walburn Prize.—A cash reward to the outstanding student in the field of civil procedure, established by the will of the late Professor Orville Hassler Walburn in memory of his mother.

Regulations

ACADEMIC WORK LOAD

Juris Doctor Candidates.—Juris Doctor candidates without substantial outside employment may take a program of studies of 14 hours a week. Such students may take courses in the evening only if they are not scheduled in the daytime and if a majority of the hours taken are in day courses. The Dean is authorized to approve programs of study of more than 14 hours in exceptional cases; however, no program will be approved which would permit the student to complete requirements for the degree in less than 28 months after beginning the first year of law study. Students with 20 hours or more of outside employment, whether in the day or evening division, must take a limited program of studies not exceeding 10 hours a week. Students taking a majority of their classes in the evening may not take more than 10 hours a week; the minimum load is 8 hours, except in special cases where 6 may be approved by the Dean for a limited time. A minimum schedule of 11 hours in the day division is required except in exceptional circumstances when a reduced program is authorized by the Dean.

Students taking more than 8 hours in the day division or 4 hours in the evening division must have the permission of the Dean to take a Bar Review course.

Students may transfer from the day division to the evening division only with the permission of the Dean.

With the approval of the Dean, second- and third-year students may take a maximum of 6 semester hours of appropriate courses in other departments of the University; such a student must receive a grade of at least *B* to obtain credit for such courses, and in no event will the grade count in computing the cumulative average.

Master's Candidates.—Master's candidates without substantial outside employment may take a maximum of 12 hours a week. Students with 20 hours or more of outside employment must take a limited program of study not to exceed 8 hours a week. The minimum load is 4 hours unless approval for fewer hours is given by the Dean for a limited time.

ATTENDANCE

Regular attendance at classes is required and is necessary for successful work. A student who is deficient in class attendance in any course may be barred from taking the examination.

CHANGES IN PROGRAM OF STUDIES

A student may not add courses or change from one section to another of the same course without the approval of the Dean. Students may drop courses only with the written approval of the Dean. In addition, approval of the instructor is ordinarily required unless the request is made early in the semester. Under no circumstances may any student drop a course after the last day of classes in any semester or summer session.

RESEARCH PAPERS

The preparation of a research paper is required in lieu of an examination in seminars and in other courses, as indicated in the course descriptions. A research paper must be submitted by the first day of the examination period (the first day any examination is given in any course). For sufficient reason the instructor may extend the time beyond this date to a later date (but not later than the last day of classes of the following semester, or without extension permission of the Dean, not later than the normal graduation date for the student), subject to the following conditions: (1) no student will receive any credit for the course for any purpose until a paper acceptable to the instructor has been submitted; (2) if a paper is submitted after the last day of examinations (or the last Wednesday before registration for the spring semester), the only grade the student may receive for the course is *CR* (Credit) or *NC* (No Credit), except that failure ultimately to submit any paper for the course will result in a grade of 45. Students who are candidates for the J.D. degree must register for one course requiring a research paper in each semester of the third year; with the approval of the Dean such students may register for more than one such course each semester. Approval of the Dean is required for second-year students to take such courses.

EXAMINATIONS

Written examinations are held at the end of most courses. Every student is required to take the regular examinations unless excused. No excuse for absence will be granted except by the Dean and then only for illness or other emergency. Application for excuse must be made in writing not later than one month after the date of the examination. A student excused from a final examination will be permitted to apply to the instructor for a Credit/No Credit determination. The instructor will select the mode of determination (for example, make-up examination or paper). The student will have the option of (1) complying (prior to the completion of the semester following the excused absence) with the instructor's procedure of determining Credit/No Credit, or (2) having the grade *I* (Incomplete) entered on the record and taking the next regularly scheduled examination for a numerical grade. The examination may not be taken after exclusion for low scholarship.

Permission to take an examination before the regularly scheduled date will not be granted. Permission to take a postponed examination is limited to the situations provided for in the preceding paragraph.

A student who has been excused from taking a regular examination and who is a candidate for a degree to be conferred prior to the next regular examination in the subject may petition the Scholarship Committee, which may authorize such action as the circumstances require.

If a student fails to take an examination, a grade of 45 will be recorded

Unless the student has been excused from the examination as provided above or has obtained the Dean's permission to drop the course.

CREDIT/NO CREDIT OPTION

Candidates for the degree of Juris Doctor may take, in addition to courses regularly given on a "Credit/No Credit" basis, 12 semester hours of elective course work on a "Credit/No Credit" basis, and will receive a grade of "Credit" if the course is satisfactorily completed with a grade of 65 or better. No student may change from a numerical grade to a "Credit/No Credit" basis in a course during the last four weeks of classes except with the permission of the instructor. An unexcused failure to take an examination in a course or failure to submit a required research paper will result in the recording of a grade of 55 for a course taken on a "Credit/No Credit" basis.

No student may take more than 17 semester hours of courses (including Law 220 and also courses regularly given on a "Credit/No Credit" basis) on a "Credit/No Credit" basis.

Students are advised to consider carefully the advisability of electing to take courses on a "Credit/No Credit" basis. In the opinion of the faculty, a student's election to take courses on a "Credit/No Credit" basis may, in view of the importance apparently attached to grades by educational institutions and employers, be detrimental to the student's career in the legal profession.

GRADES

Grades are given in numerical terms equivalent to letter grades as follows: 85–100, *A*, Excellent; 75–84, *B*, Good; 65–74, *C*, Satisfactory; 55–64, *D*, Poor but below standard for graduation: 45–54, *F*, Failure. In Law courses 220, 321–324, 323, 342, 343, 345, 346, 385, 399, 459, 479, 509, 579, and 593 grades are CR, Credit (minimum grade of 65 required for J.D. candidates, 75 required for LL.M. candidates); *NC*, No Credit. A student who has been excused from taking a regularly scheduled examination is given the grade of *I*, incomplete. See "Examinations" (page 40) for grade upon failure to take an examination. Grades between 55 and 100 indicate that the work has been completed and credit given. Grades between 55 and 64, however, do not represent satisfactory work and adversely affect a student's cumulative average. No credit is given to J.D. candidates for grades below 55 or to post-J.D. candidates for grades below 65. No grade may be changed by an instructor after it has been posted in the law school or disclosed to a student unless there has been an error in arithmetic certified in writing as such by the instructor.

Any student who receives a grade below 55 (*F*) has the right to retake the course once, from the same or a different instructor, but only within the next academic year. (This does not apply to post-J.D. students.) The grade received in the retaken course shall be entered into the student's record in addition to the original grade, and both grades shall be included in computing the student's average. A student may exercise the right to retake a course only with respect to two different courses during study at the Law Center.

The cumulative average of a student includes all grades in all courses taken while a candidate for a particular degree.

EXCLUSION AND PROBATION FOR POOR SCHOLARSHIP

Candidates for the Degree of Juris Doctor.—A student whose cumulat
average at the end of any semester falls below 65.0 but is above 64.0 will
put on probation. If such a student fails to raise the cumulative average
65.0 at the end of the next semester, the student will not be permitted
register for any succeeding semester unless the student petitions for and
ceives the permission of the Scholarship Committee.

A student whose cumulative average at the end of any semester falls bel
64.0 will not be permitted to register for any succeeding semester unless
student petitions for and receives the permission of the Scholarship Commit
to register.

A student who fails more than one course over the entire period of law stu
will not be permitted to register for any succeeding semester or to graduate
less the student petitions for and receives the permission of the Scholarsh
Committee.

A student who is not permitted to register under the foregoing provisio
will be excluded as of the beginning of the semester for which the student w
ineligible to register.

Students who are registered at the time they receive notice that they will
be permitted to register for the next semester are entitled to withdraw fro
school and to receive a full refund of the tuition paid for the semester, or
complete the work for which they are registered.

Any student excluded may petition for reinstatement; if the student ca
demonstrate that the low grades were due to circumstances beyond the student
control and that the student has the capacity to pursue the study of law with
definite likelihood of success, that student may be readmitted subject to suc
conditions as may be imposed by the Scholarship Committee.

Despite the above provisions, a student will be allowed to complete the fir
two semesters of law study before being denied permission to register for
succeeding semester.

For this purpose the term "semester" includes a session of the summer term

Candidates for Masters' and Doctoral Degrees.—A candidate for a master
or doctoral degree whose work is not satisfactory in the opinion of the faculty
taking into consideration the requirements and standards for the degree, may
by action of the faculty, be excluded at the end of the semester for which the
candidate is currently registered.

A cumulative average of 78 (see page 20) is required for the Master of Law
degree and a cumulative average of 65 (see page 25) for the Master of Com
parative Law degrees. A student whose cumulative average falls below the re
quired minimum at any time will be ineligible for continuation in the program
without the permission of the Dean. Such a student will not be permitted to
register for any succeeding semester unless the student petitions for and re
ceives the permission of the Dean or the Board for Graduate Studies.

Unclassified Students.—An unclassified student whose work is not satisfac
tory may be excluded at the end of the semester for which the student is cur
rently registered.

SUMMER SCHOOL CREDIT

Students planning to attend summer school sessions at other law schools and
desiring to use credits obtained at such schools in their Juris Doctor program

at this Center must first have the courses they wish to take approved by the Dean. Students may not take courses in summer sessions at other law schools in this vicinity if these same courses are being given during the Summer Sessions at the National Law Center. In no event will credit be given for unsatisfactory work or be recognized in excess of that which might be obtained in a similar period in this program.

TRANSCRIPTS OF RECORD

Official transcripts of student records will be issued on request of the student or former student who has a clear financial record. A fee of $2 is charged for each transcript. When more than two transcripts are ordered at the same time, a $2 fee is charged for each of the first two transcripts and a $.50 fee is charged for each additional transcript.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until *all* degree requirements are satisfied. By failing to register for one semester or more, the student breaks his registration and must be readmitted (see "Readmission," page 29). A "Readmitted Student" is required to satisfy the curriculum requirements existing at the time of his readmission. Post-J.D. students who have completed course requirements may maintain continuous registration by paying the "continuous registration" fee (see page 32); *J.D. degree candidates may not maintain continuous registration by paying the "continuous registration" fee.*

GRADUATION REQUIREMENTS

Diplomas are awarded in February, May, and September.

To be recommended by the Faculty for graduation, a student must have met the admission requirements of the National Law Center; completed satisfactorily the scholarship, curriculum, residence, and other requirements for the degree for which the student is registered; and be free from all indebtedness to the University. Registration, either for course work or on the "continuous registration" fee basis, is required for the semester or summer session at the close of which the degree is to be conferred.

Application for Graduation.—An "Application for Graduation" form must be filed and the appropriate fee paid at the time of registration for the last semester or summer session of the final year. Students completing degree requirements during the Summer Sessions will be awarded diplomas (no formal Convocation) September 30, *provided* they have completed all degree requirements and have applied for graduation as a part of registration for the Summer Sessions. If they wish, such students may participate in the Winter Convocation.

ACADEMIC DISHONESTY

The University community, to fulfill its purposes, must establish and maintain guidelines of academic behavior. All members of the community are expected to exhibit honesty and competence in their academic work. Incoming students have a special responsibility to acquaint themselves with, and make use of,

all proper procedures for doing research, writing papers, and taking examin
tions.

Members of the community will be presumed to be familiar with the prop
academic procedures and held responsible for applying them. Delibera
failure to act in accordance with such procedures will be considered academ
dishonesty. Acts of academic dishonesty are a legal, moral, and intellectu
offense against the community and will be prosecuted through the proper ch
versity channels.

Copies of the University policy on academic dishonesty can be obtain
from the following offices: all department chairmen, all academic deans, an
the Vice President for Academic Affairs.

MILITARY LEAVE

A student called to active duty may be granted military leave for the period o
active duty, upon presentation to the Dean of a copy of the military orders an
a petition for such leave. The maintenance of "continuous registration" is n
required of the student on military leave; however, the student must apply fo
readmission to the University well in advance of the semester of expecte
return. Payments for tuition and fees which are not refunded to the studen
at the time military leave is granted will be maintained as a deferred credit fo
the student's account and use upon return to the University.



UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

The Family Educational Rights and Privacy Act of 1974 applies to institutional policies governing access to and release of student education records maintained by educational institutions which are recipients of federal funds. The University complies with this statute, which states, in part, that such institutions must:

1. afford students access to education records directly related to them;
2. offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate;
3. receive the student's written consent before releasing information from his or her education records to persons outside the University, except for directory information as indicated below. Information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency; and
4. comply with a judicial order or lawfully issued subpoena to release a student's record, notifying the student of this action.

The University will release the following directory information upon request: name, local address, and telephone number; name and address of next of kin; dates of attendance; school, college, or division of enrollment; field of study; credit hours earned; degrees earned; honors received; participation in organizations and activities chartered or otherwise established by the University (including intercollegiate athletics); and height and weight of members of athletic teams. A student who does not wish such directory information released must file written notice to this effect in the Office of the Registrar.

Copies of the University's full policy statement on the release of student information may be obtained from the Office of the Registrar.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the right to modify or change requirements, rules, and fees. Such regulations shall go into force whenever the proper authorities may determine.

RIGHT TO DISMISS STUDENTS

If a student knowingly makes a false statement or conceals material information on an application for admission, registration card, or any other University document, the student's registration may be canceled and the student will be ineligible (except by special action of the Faculty) for subsequent registration. The right is reserved by the University to dismiss or exclude any student from the University or from any class or classes, whenever, in the interest of the student or the University, the University Administration deems it advisable.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs without notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "L and Found" Office is maintained on campus in the Safety and Security Offi

STUDENT CONDUCT

All students upon enrolling and while attending The George Washington U versity are subject to the provisions of the *Statement of Student Rights a Responsibilities* which outlines student freedoms and responsibilities of condu the Judicial System for Non-Academic Student Discipline, and other polic and regulations as adopted and promulgated by appropriate University autho ties. Copies of these documents may be obtained at the Office of the Vice Pre dent for Student Affairs. Sanctions for violation of these regulations may clude permanent expulsion from the University, which may make enrollment another college or university difficult. Regulations or requirements applica only to a particular program, facility, or class of students may not be publish generally, but such regulations or requirements shall be published in a manne reasonably calculated to inform affected students.

UNIVERSITY POLICY ON DRUGS

The University cannot condone violations of law, including violation of the laws which proscribe possession, use, sale, or distribution of drugs. Members the academic community should know that administrative action, which ma include dismissal from the residence halls, revocation of other privileges, or su pension or dismissal from the University, may be taken in order to protect th interests of the University and the rights of others.

Center for Academic and Administrative Computing

Director F. William Rambo

THE CENTER FOR ACADEMIC AND ADMINISTRATIVE COMPUTING is located on the third floor of Lisner Hall, 2023 G St., N.W. The computer and other opera tional supportive services are located on the first floor of Stuart Hall, 2013 G St., N.W. These facilities normally are available 24 hours a day, seven days a week to all qualified faculty, staff, and students.

The Center provides computational facilities, conducts seminars, consults with users, and provides operational assistance as required. The Center operates an IBM 370/148 (OS/VS1) central processing unit and a PDP 11 mini computer which provides terminal and card remote-job-entry (RJE) to the 370/148 for students. There is a full range of compilers and application soft ware packages.

Computer programming courses are offered by the School of Government and Business Administration, the Department of Statistics, and the School of Engineering and Applied Science. In addition, many other departments offer courses that utilize the computer as a research adjunct to course work.

Student Services

RESIDENCE HALLS

The University does not provide regular residence hall space for graduate students. However, the Housing Office refers graduate students to apartments as they become available in three University-owned buildings which are in the campus area. Additionally, the Housing Office operates an Off-Campus Housing Resource Center, and attempts to provide information and assistance for those seeking accommodations. For complete information on this service, as well as apartment guides and referrals, interested applicants should contact Director of Housing, George Washington University, Washington, D.C. 20052.

FOOD SERVICE

Contract food service is available from August to May, and is based on the undergraduate academic calendar of registration, exams, and vacation periods. Alternative accommodations for the law school calendar are made. The rate for the seven-day, 19 meals per week plan has been set at $874. The any 14 meals per week plan costs $822; the any 10 meals per week plan, $710. Contract service is cafeteria style and provided in two residence halls and the Cloyd Heck Marvin Center. Meal coupons may also be used on a cash equivalency basis in the Marvin Center first floor a la carte cafeteria and in the Rathskeller.

CLOYD HECK MARVIN CENTER

The Cloyd Heck Marvin Center serves as the campus community center, providing services, conveniences, and recreational and social opportunities for students, faculty, staff, alumni, and guests. Its wide range of facilities provides the setting for a variety of programs conducted by the University Program Board; the departments of Drama, Dance, and Music; and other student and faculty organizations.

The Center Governing Board, representing varied segments of the University community, plays an important role in the day-to-day functioning of the Center. This Board works closely with the full-time staff in the development of procedures and policies which provide a framework for the Center's operation.

STUDENT HEALTH SERVICE

The Student Health Service is an outpatient clinic located in the H.B. Burns Memorial Building at 935 22nd St., N.W.

Physicians and physician assistants are available by appointment from 9 a.m. to 4:45 p.m., Monday through Friday. In addition, physician assistants are available for primary care to walk-in patients Monday through Friday from 5 to 5:45 p.m., on Saturday from 9 a.m. to noon, and on Sunday from 10 a.m. to noon.

For serious emergencies occurring during hours when the Student Health Service is closed, students may go to the Emergency Room of the University Hospital for treatment. This arrangement is for emergency care only, and all fees are the responsibility of the student.

Students must be currently enrolled on campus in the University to rece
treatment at the Student Health Service. Students who so desire may eng
physicians and nurses of their own choice, but these students will be respons
for all fees charged. The bills incurred from all services rendered outside of
Student Health Service (for example, x-ray work, laboratory work, and refer
to specialists or other outside physicians) are the responsibility of the stude

Health and Accident Insurance

The Student Health Service Office has arranged for and endorsed group hea
and accident insurance, on an elective basis, for those *full-time* students w
do not have other coverage. Interested students should contact the Stude
Health Service Office.

STUDENT EMPLOYMENT

A student taking more than 10 semester hours must limit outside empl
ment to less than 20 hours (see "Academic Work Load," page 39). It
urged that full-time students refrain from engaging in outside employme
during their first year. Although work in some special areas may contribu
to the learning and experience of the student, as a general rule it will comp
with time needed for adequate study and preparation, which are at the heart
a good legal education.

PLACEMENT SERVICE

The Law Center takes a continuing interest in the placement of its stude
and alumni. The Dean, the Faculty, and the Placement Office cooperate
providing information from alumni, law firms, government agencies, and oth
sources concerning job openings for our seniors and alumni throughout t
country. Other services include part-time and full-time law clerk listings, sum
mer positions, programs on job-seeking skills, a library of available literatu
on law placement, counseling on various opportunities, resume preparatio
guidance, arrangement of on-campus interviewing programs, and the admini
tration of the judicial clerkship evaluation program.

Of the 1977 graduating class, 257 graduates informed the Placement Offi
that they held legal positions. There was considerable variety in the types o
legal positions obtained, with 117 in private law firms; 55 with the federal gov
ernment; 17 with state and local government agencies; 14 with corporations; 3
as judicial clerks; and 9 with legal services. The remaining graduates were en
gaged in various positions with accounting firms; military service; academi
communities; labor unions and trade associations.

VETERANS BENEFITS

The veterans counselor, located on the fifth floor of Rice Hall, 2121 Eye Street,
N.W., assists students entitled to educational benefits as veterans, widows, or
children of deceased or totally disabled veterans with any problems which may
arise concerning their benefits. This Office also processes certification of en
rollment and attendance to the Veterans Administration so that monthly al
lowances will be paid.

When feasible, students entitled to benefits as veterans or dependents of veterans should consult with the veterans counselor prior to submitting application to the Veterans Administration. All such students should obtain the instruction sheet issued by the Office of the Registrar, which sets forth requirements to be fulfilled before certification of enrollment can be made to the Veterans Administration, and which includes other information of general interest.

The Veterans Administration is at 941 N. Capitol St., N.E., Washington, D.C. 20421.

OFFICE OF SERVICES FOR STUDENTS WITH DISABILITIES

The Director of the Office of Services for Students with Disabilities coordinates advising, orientation, and special services which address the needs of disabled students. The Director also serves as a central point of contact from which the University community may obtain information and assistance in serving disabled students. A resource library maintained in the Services Office is available for general use.

In addition to coordinating a program of general assistance to promote integration of disabled students as fully as possible into the life of the University community, the Director administers reading and sign language services for those with visual and auditory handicaps.

The Office of Services for Students with Disabilities is located on the fourth floor of Rice Hall, 2121 Eye Street, N.W.

COURSES OF INSTRUCTION

THE COURSES OF INSTRUCTION listed below are subject to change. The Uni
sity reserves the right to withdraw any course announced.

The number of hours of credit given for the satisfactory completion
course is indicated in parentheses after the name of the course. Thus, a
course giving two hours of credit each semester is marked (2–2), and a se
ter course giving two hours of credit is marked (2).

In most courses, a final examination is held during the examination per
and the grade in the course is determined in large part by that examinat
These courses are parenthetically marked "Examination."

Courses that require the preparation of a major research paper in lieu o
examination are parenthetically marked "Research Paper." The satisfac
completion of such a paper by a student individually will satisfy the Le
Writing curriculum requirement for the J.D. degree.

Courses parenthetically marked "Problem Assignments," "Writing Ass
ments," "Take-home Examination," "Choice of Paper or Examination,"
"Clinical Work" indicate the nature of the method planned by the instruc
for determining in major part the grade to be given for the course. A cou
marked with any of these designations will not satisfy the Legal Writing cur
ulum requirement for the J.D. degree.

Day classes begin at 9:10 a.m. and run throughout the entire morning a
afternoon. Evening classes begin at 5:50 p.m. Many examinations for da
day and evening classes may be given in the afternoon only. Examinations
day students may be held in the evening.

A parenthetical designation at the end of a course description indicat
whether the course is scheduled to be offered in the spring or fall semester
in the summer sessions, and also usually whether it will meet in the day
evening. When a double-numbered course is designated "Academic year," t
first half of the course is scheduled to be offered in the fall, the second ha
in the spring. Courses with no parenthetical designation indicating time o
offering are not scheduled to be given during the 1978 summer sessions or th
1978–79 academic year.

Courses for Juris Doctor Candidates

Required courses are numbered from 201 to 300. Courses numbered from 301
to 400 are normally taken by second- and third-year students. Courses num-
bered from 401 to 600 are generally more advanced. Second-year students

...y take courses numbered above 400 only with the permission of the Dean. ...hird-year students are encouraged to take one course numbered above 400 ...ch semester, and may take more than one such course with the permission ...f the Dean.

The following courses are among those offering clinical work: Law 343, 345, ...96, 394, 396, 399, 459, 479, 513, 516, 579.

REQUIRED COURSES

203–4 **Contracts I–II** (4–2) Nash, Cibinic, Pock, Ginsburg, Caplan

Legal remedies of contracting parties, including damages in contract and quasi-contract, specific performance, reformation, rescission, remedies in tort; acts creating and terminating contractual rights, including offer and acceptance, mistake, problems of proof; function of consideration; conditions; assignments; third-party beneficiaries; effect of changed circumstances; protection of the client's interests upon breach or threat of breach by the other party. Emphasis on problems of analysis, draftsmanship, adversary method. (Examination) (Academic year—day and evening)

207 **Torts** (4) Seidelson, Banzhaf, Schwartz, Sirulnik, Reitze, O'Dea

Liability for harm to person or property. Intentional torts, negligence, nuisance, products liability, misrepresentation, defamation, and invasion of privacy; fault and other basis for shifting losses; causation; damages; effects of liability insurance; problems under Federal Tort Claims Act. (Examination) (Fall—day and evening)

211 **Property** (4) Starrs, Schiller, Brown, Chandler

Basic concepts of personal property. Real property: historical background of the law of estates and conveyancing, types of estates, dower and curtesy, landlord and tenant relationship, concurrent estates, future interests at common law and after the Statute of Uses; introduction to modern conveyancing—the real estate contract, the deed, the recording system, methods of title assurance. (Examination) (Fall—evening; spring—day; summer 1978)

212 **Constitutional Law** (4) Green, Mayo, Barron, Park

Basic principles of American constitutionalism; judicial function in constitutional cases; implementation of doctrines of separation of powers, federalism, limited government; development and exercise of national powers; introduction to civil rights and liberties. (Examination) (Spring—day and evening)

215 **Criminal Law and Procedure** (4) Starrs, Robinson, Zenoff, Sirulnik, Caplan

Origin and purposes of criminal law; elements of criminal liability; mental disorders; crimes against the person, property, and against both; statutory offenses; criminal procedure, with consideration of Federal Rules of Criminal Procedure. (Examination) (Fall—day; spring—evening)

218 **Civil Procedure** (4) Sharpe, Schwartz, Kayton, Smalls, Stevenson, O'Dea, Ross

Mechanics of litigation—rules which govern the process by which rights and duties studied in substantive law courses are enforced; pleadings, discovery, pre- and post-trial motions, jurisdiction and venue, equity jurisdic-

tion and trial by jury, former adjudication. Emphasis on Federal R of Civil Procedure, but principles and main problems indigenous to procedural systems are developed. (Examination) (Spring—day evening)

220 **Legal Research, Writing, and Professional Responsibility and Ethics** (2) Seidelson and S

Introduction to and practical experience in the use of a law library; struction and practice in legal writing, including a memorandum appellate court brief; instruction and experience in the preparation argument of an appellate court case; instruction in questions of pro sional responsibility and ethics. The grade *CR* (Credit) or *NC* Credit) is given for this course. For credit, a student must attain a mum grade of 65. (Fall—day and evening)

232 **Evidence** (4) Seidelson, Robinson, Albert, P

Preparation and presentation of evidence, including proof of writi qualification and examination of witnesses with emphasis on impeachm privilege; opinion testimony; determination of relevancy; demonstrati experimental, scientific evidence; application of the hearsay rule. (Exa nation) (Spring—day and evening; summer 1978)

ELECTIVE COURSES

Shar

302 **Admiralty** (2)

American practice and jurisdiction in admiralty; saving clause actions law. Substantive maritime law of title and possession, maritime lie personal injury and wrongful death, charter parties and bills of lad general average and salvage and marine insurance, collisions. Lawmak methods: judge-made law, statutes, international commercial custom, a treaties. (Examination) (Spring—day; summer 1978)

Mallis

303 **International Law and World Order** (3)

An introduction to international law which provides the backgro for the study of specialized seminars; emphasis on national states participants in decision-making processes with consideration also of i dividuals; analysis of range of available sanctions; roles and effects international agreements under United States Constitution; introduct study of the World Bank. Complements but does not repeat material Law 304. (Examination) (Fall—day and evening; summer 1978)

Mallis

304 **United Nations Law and World Order** (2)

Introduction to international law through study of law and practice United Nations Charter; structure and process of decision of United N tions; maintenance of international peace and security—peaceful settl ment of disputes and national and collective self-defense; including cu rent problems considered by the United Nations. Complements but do not repeat the material in Law 303. (Examination) (Spring—day evening)

307 **Comparative Law** (3) Liebesny, Delaum

A general introduction to the world's main legal systems with emphasis on civil law. Comparative study of the administration of justice, pr cedural problems, and selected substantive legal institutions. (Exam nation) (Spring—day)

309 **Conflicts of Laws** (3) Seidelson, Pock, Lowther, Smalls

Legal problems arising from occurrences transcending state or national boundaries; jurisdiction; foreign judgments; constitutional influences; theoretical bases of choice of law principles and their application to specific fields, including torts, contracts, property, family law, administration of estates, business associations. The grade *CR* (Credit) or *NC* (No Credit) only is given in sections taught by Lowther. Lowther—(Problem Assignments); Seidelson, Pock—(Examination) (Fall—evening; spring—day; summer 1978)

311 **Agency and Partnerships** (2) Sharpe, Schiller

Employment relations, vicarious liability of employers for employees' torts, scope of employment, and independent contractors; agents' authority and apparent authority to contract for their principals, ratification; nonprofit associations; the formation, operation, and termination of partnerships; limited partnerships. (Examination) (Fall—day and evening; summer 1978)

312 **Corporations** (4) Kirkpatrick, Green, Stevenson, Fielding, Solomon, Park

Corporate law, with emphasis on operations and financing of corporations. Control of corporations, action by corporate directors, officers, shareholders. Control devices. Directors' and shareholders' duties of care and loyalty, insiders' transactions in shares of the corporation. Derivative suits, kinds of shares, dividends, corporate distributions. (Examination) (Fall—day and evening)

313 **Sales and Sales Financing** (2) Albert, Rothschild, Ginsburg

Provisions of the Uniform Commercial Code relating to sale and distribution of goods, including bulk transfers, warehouse receipts, bills of lading, and other documents of title; particular attention to secured transactions and financing devices utilized in this connection. (Examination) (Fall—day and evening)

314 **Commercial Paper, Check Collection, and Banking** (2) Albert, Rothschild, Schwartz, Ginsburg

Classic view of negotiable instruments as codified by Article III of the Uniform Commercial Code. Check collection: the system in theory as expressed in Article IV of the Uniform Commercial Code and the system in practice; Federal Reserve regulations, Clearing House agreements, and automation systems. The dual banking system, work of the Comptroller General and the Federal Reserve Board. Legal problems concerning interest and the checkless society. (Examination) (Spring—day and evening)

318 **Creditors' Rights** (3) Kirkpatrick, Fielding

Creditors' remedies outside bankruptcy—compositions, agreements, general assignments; bankruptcy proceedings under the federal statute, administration, discharge, the position and powers of the trustee, preferences; corporate reorganization under Chapter X of the Bankruptcy Act. (Examination) (Fall—day; spring—evening)

321-22 **Current Decisions** (2–2)

Limited to members of the student staff of the *Law Review*. A maximum of 4 semester hours of credit may be earned in this course. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Academic year—day and evening)

323 Journal of International Law (1 or 2)

Limited to editors of the student staff of the *Journal of International and Economics*. The grade *CR* (Credit) or *NC* (No Credit) is give this course. (Fall and spring—as arranged)

325–26 Trusts and Estates I–II (3–3) Weaver, Chandler, Sole

Noncommercial transfers of wealth at death or during life. Law essential elements and formalities for creation of trusts and executio wills, revocation and alteration, grounds for contest, limits on pro owner's power to control, intestate succession. Law 326: dispos provisions, common questions of construction, future interests probl administration of estates and trusts, charitable trusts. Prerequisite to 325: Law 211; to Law 326: Law 325. (Examination and Problem signments) (Law 325: fall—day and evening; spring—day; sum 1978; Law 326: spring—day and evening)

327 Modern Real Estate Transactions (2) Brown, Sch

Advanced problems in purchase and sale of real estate: legal responsib and functions of buyer, seller, broker, escrow agent, conveyancing a ney, title examiner, abstractor, insuror of title; process of examination assurance of title and other interests in realty, including recording, r tration and title insurance systems, settlements and closings, warran hazard insurance; emerging problems related to cooperatives, condo iums and property-owners' associations; problems related to compli with subdivision, zoning, building and housing code regulations. (Ex nation) (Spring—day; summer 1978)

329 Unfair Trade Practices (3) Weston, Banzhaf, Schw

Unfair trade practices at common law and under statutes; trademar trade names; copyright law; misappropriation of ideas; protection of co petitors and consumers against false advertising under Federal Tra Commission Act; resale price maintenance under state Fair Trade A state sales-below-cost statutes; Robinson-Patman Price Discrimination A miscellaneous business practices. (Examination) (Fall—day evening)

330 Federal Antitrust Laws (3) Weston, Kirkpatri

Sherman and Clayton Acts, related statutes. Price-fixing agreements other types of trade restraints considered under Section 1; monopoliz considered under Section 2 of the Sherman Act. Mergers and tie-in sal other activities under the Clayton Act. All types of business conduc raising questions under the antitrust laws, including trade association tivities, exclusive-dealing arrangements, boycotts, patents and copyright (Examination) (Spring—day and evening)

331 Product Liability (2) Schwar

Development of the concept of product liability and consumer's remedie Specific problems and processes in evaluation of risk and benefit e countered in government regulation of dangerous and defective produc Survey of civil actions for harm resulting from defective and dangerou products with reference to parties and proof in negligence, warranty, str sance, fraud, misrepresentation, and other cases. Problems associated wit hazard identification, insurance, and industry self-regulation. Review o Consumer Product Safety Act and current legislation dealing with th juries and remedies in specific areas. (Choice of Research Paper o Examination)

332 **Federal Jurisdiction** (2) Albert, Lowther, Barron, Smalls, Kayton

Relationship of federal courts to Congress and to the states, through analysis of cases dealing with federal judicial functions (including problems of advisory opinions, standing to litigate, justiciability), federal questions in federal courts, federal review of state court decisions (including relation between state and federal substantive law, procedural problems in exercising review, application of law to fact). The grade *CR* (Credit) or *NC* (No Credit) only is given in sections taught by Lowther. Albert—(Examination); Lowther—(Problem Assignments) (Fall—day and evening; summer 1978)

334 **Advanced Criminal Procedure** (2) Starrs, Robinson, Zenoff

Decision to arrest, prosecutive discretion, bail, the preliminary hearing, right to a speedy trial, discovery, plea bargaining, publicity, post-conviction procedures. Starrs—(Examination and Problem Assignments); Robinson, Zenoff—(Examination) (Fall—day and evening; summer 1978)

335 **Jurisprudence** (2) Mayo, Kramer, Park

Basic jurisprudential concepts; nature of law; development of legal institutions; jurisprudential schools—natural law, analytical, historical, sociological, functional; law and logic; law and justice; the judicial process; legislative, executive, administrative decision-making; impact of politics, economics, and scientific advance on legal systems; contemporary trends in jurisprudential thought. Mayo and Park—(Examination); Kramer—(Writing Assignments) (Fall—evening; spring—day; summer 1978)

336 **Taxation—Federal Income** (3) Weaver, Hambrick, Fielding, Solomon, Kempler

Survey of substantive provisions of federal income tax law, including concept of gross income, provisions affecting taxation of family and individual transactions, limitations on allowable deductions, sales and dispositions of property, problems of capital gains taxation, nontaxable exchanges. Weaver—(Examination and Problem Assignments); Hambrick—(Examination) (Fall—day; spring—day and evening; summer 1978)

338 **Taxation—Federal Estate and Gift** (2) Kramer, Hambrick, Weaver, Gallagher

Survey of substantive provisions of federal estate and gift tax laws, including inter vivos transfers, transfers in contemplation of death, joint interests, life insurance proceeds, property subject to powers of appointment, marital deduction and split gifts; tax procedure. (Examination) (Fall—evening; spring—day and evening)

339 **Collective Bargaining and Labor Arbitration** (3) Merrifield, Rothschild

Collective labor agreement: content, negotiation, administration through grievance procedure and arbitration; problems in settlement of labor disputes. Prerequisite: Law 341. Merrifield—(Examination and Problem Assignments); Rothschild—(Problem Assignments) (Spring—day and evening)

340 **Taxation—Federal Income, Corporations and Shareholders** (3) Hambrick, Fielding, Solomon

Continuation of Law 336. Primary emphasis on corporate-shareholder relationships. Problems of corporate dividends, redemptions of stock, distributions in partial and complete liquidation, stock dividends, bail-outs, and dividends in kind closely analyzed. Federal income tax problems

involved in the formation of corporations, the sale of corporate business (including collapsible corporations), mergers and acquisitions, and corpo rate divisions. Students who have received credit for former Law 35 cannot receive credit for Law 340. Prerequisite: Law 336. (Examina tion) (Fall—evening; spring—day)

341 Labor Law (3) Merrifield, Albert, Rothschi

Law governing labor-management relations, organizations and represent tion of employees, regulation of economic weapons, enforcement of co lective bargaining agreements, interunion and intra-union relations. (E amination) (Fall—day and evening; summer 1978)

342 Moot Court (1 or 2)

Satisfactory participation in the upperclass competition results in on hour of academic credit. Finalists in the upperclass competition receiv two hours of academic credit. Finalists in the first-year competition receive one hour of academic credit. No academic credit is awarded nonfinalists in the first-year competition. The grade *CR* (Credit) or *N* (No Credit) is given for this course. (Fall and spring)

Sirulni

343 Law Students Civil Rights Research Council (LSCRRC) (1 or 2)

Clinical problems concerned with the legal problems of minorities women, and the poor. Students work with organizations such as the Lawyers Committee for Civil Rights Under Law, Women's Legal Defense Fund, Civil Rights Division of the Justice Department, Institute for the Development of Indian Law, National Committee Against Discrimination in Housing, and National Senior Citizens Law Center. Approximately 60 hours of work per semester is required for each credit hour. (Fall, spring, summer—as arranged) The grade *CR* (Credit) or *NC* (No Credit) is given for this course.

Stahl

344 Legal Writing (1 or 2)

Preparation of a research paper under the supervision of a full-time member of the Faculty who will determine, prior to registration, whether the work required for the topic selected justifies one or two semester hours of credit. If elected for one hour of credit, this course may be repeated to meet the legal writing requirement for the degree. Approval of the faculty member is required prior to registration. (Research Paper) (Fall and spring—as arranged; summer 1978)

Zeno

345 Students-in-Court (4)

Open only to third-year law students. In the D.C. Law Students in Court Program, students represent indigent litigents in the Small Claims, Landlord-Tenant, and Criminal (misdemeanors) division of the D.C. Superior Court. Their duties include client interviews, investigation, settlement negotiations, preparation and argument of motions, and conduct of trials. Students are required to spend one day in court and attend seminars each week (Wednesday or Thursday evening at the student's option in the civil program; Monday evening and Saturday morning in the criminal program). Some seminars will be held off campus. Application must be made during the spring semester of the preceding academic year; preference will be given to students with a cumulative-grade average above 70; however, consideration is given to past participation in clinical or extra-

curricular activities or employment which provides background for litigation and working with indigents. Students may participate during the summer, during the full academic year, or during the summer plus one other semester. This course may not be taken at the same time as Law 579, or any litigating activities in Law 346. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged; summer 1978)

346 **Legal Aid** (arr.) **Staff**

Work done in connection with the Legal Aid Bureau under the supervision of the faculty adviser, who will determine, prior to registration, the number of semester hours of credit the work required will justify and whether the student has all prerequisites. Any litigating activities of this course may not be taken at the same time as Law 345, or 579. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—as arranged)

347 **Insurance** (2) **Schiller, Pock**

A primary risk-distributing medium and the rules by which legislative, administrative, and judicial bodies seek to promote its benefits and avert its dangers. Includes insurance marketing, insurable interest, subrogation, transfer of insurance benefits to nonpolicyholders, coverage and other insurance policy provisions, disposition of claims. (Examination) (Fall—day and evening; summer 1978)

348 **Domestic Relations** (2) **Potts, Zenoff**

Marriage, annulment, and divorce; adoption and custody of children; economic relations. (Examination) (Fall—evening; spring—day)

351 **Law and Accounting** (2) **Cibinic, Ginsburg, Herman**

Study of fundamental accounting principles with emphasis on corporation accounting; legal and accounting implications of specific items in financial statements of corporations; inventory adjustments; corporate transactions, distributions, capital adjustments. Strongly recommended for students who have had no accounting. (Examination and Problem Assignments) (Fall—evening; spring—day)

355 **Government Contracts** (3) **Nash, Cibinic**

Survey of basic law underlying government procurement, basic power and limitations on federal government in entering into contracts, administrative and legislative policies governing these contracts, advertised and negotiated procurement procedures, forms of contracts and clauses used. Law 431 *Government Procurement Law* is the substantial equivalent of this course. (Examination and Problem Assignments) (Spring—day)

359 **Patent Law** (3) **Kayton, Schwaab**

Law of patents subsequent to issuance of patent; nature of patent as property and as a legal instrument; validity—novelty, nonobviousness, commercial success; infringement—direct and contributory, doctrine of equivalents and file-wrapper estoppel. Substantive concepts introduced in an order approximating patentee's and infringer's cases in litigation. Designed for students intending to specialize in patent law; knowledge or experience

in patent law helpful but not prerequisite. (Examination) (Fall—evening)

362 Patent Office Practice (2) Kayton, How

Substantive and procedural law of patents leading to issuance of pat mainly related to proceedings before U.S. Patent Office. Obtaining a preserving earliest possible patent filing date; continuing applications; judicata, novelty and nonobviousness requirements; substantive rules priority of invention and related affidavit practice; nature of claims; formal defects; restriction and double patenting. Designed for studen intending to specialize in patent law. Prerequisite: Law 359. (Examina tion) (Spring—evening)

372 Administrative Law (3) Park, Banzhaf, Barr Schwartz, Sh

Study of the administrative process in executive and independent regu tory agencies; emphasis on judicial review. Formal and informal decision making, investigation, planning, and public administration functions the agencies as related to their legal limits and to the roles of lawyers government and private practice. Relationships of agencies to the execu tive and legislative branches, to public and private interest groups, and the social, political, and economic aspects of various philosophies government regulation. Park—(Examination and Writing Assignments) Banzhaf—(Examination) (Fall—day; spring—evening)

375 Remedies (3) Cibinic, Ginsburg, Nash, Lowther, Smo

Development and use of judicial remedies that give relief for past threatened injuries to interests of personalty and property. Remedial a proaches include compensatory and punitive damages, injunctions, u enrichment, constructive trusts, equitable liens, tracing, subrogation, a specific reparation. Emphasis on comparing remedial options in fra mistake, duress, breach of contract, and abuse of fiduciary relationsh The grade *CR* (Credit) or *NC* (No Credit) only is given in sections tau by Lowther. Cibinic, Ginsburg—(Examination); Lowther—(Problem a signments) (Spring—day and evening)



377 **Legislation** (2) **Ferster**

Legislative process and roles of participants in the process; operation of United States Congress and state legislatures, including fact finding, organization, procedure. Statutory interpretations emphasized to provide foundation for more advanced courses. (Examination)

385 **Trial Practice Court** (2) Jackson, Ryan, Kendrick, McMullin, Skinker, Stevas, Altshuler, Nunzio, Seidel

Trial of assigned cases, trial techniques, pre-trial and courtroom procedures pursuant to federal rules. Students may repeat this course once for credit. Prerequisite: forty-two semester hours, including Law 218. Prerequisite or concurrent registration: Law 232. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day and evening)

389 **Medicine for Lawyers** (2) **Hirsh**

Survey of the basic medical sciences and the rudiments of clinical medicine as encountered in the practice of law. Medical terminology, the disease process, trauma, and industrial medicine. The application of this fundamental information is demonstrated in personal injury or negligence and malpractice litigation as well as in commitment and equitable proceedings. Students may witness autopsies at the D.C. Medical Examiner's Office, surgery at George Washington University Hospital, and medical rounds at D.C. General Hospital. Emphasis on enabling the lawyer to communicate most effectively with medical specialists. (Examination) (Fall—day)

390 **Law and Medicine** (2) Sharpe, Fiscina, Head
(Formerly Forensic Medicine)

Malpractice, insurance, and alternatives to professional liability litigation; securing and presenting medical evidence to prove causation and damages; chemical test data and behavioral science findings in court; entry into and practice of the professions; professional organizations; hospitals; professional service delivery; public policy intervention in medical science—for example, abortion, transplantation, and coerced treatment. (Examination) (Fall—day and evening)

394 **Women and the Law** (2) **Ross**

An examination of the treatment of women in all areas of the law and of legal remedies for sex discrimination. Emphasis on constitutional law, criminal law, discrimination in the media, education, and employment. Students choose clinical projects or research papers on which to focus the semester's work. Enrollment limited to 30 students. (Research Paper) (Spring—evening)

396 **Legal Activism** (2 or 3) **Banzhaf**

Study of the use of law and the legal process, not as a technique for resolving disputes between identified individuals and/or organizations, but as a powerful tool for ameliorating problems of general public interest. Principles and techniques of legal activism, maximum effectiveness of public interest actions, how these actions differ from conventional legal practice. To learn these techniques effectively, and to test and develop their proficiency in their use, students will form clinical project groups and

initiate or participate in a legal or law-related activity directed against
public interest problem of their own choosing. (Spring—day)

398 National Center for Law and the Deaf Clinical Education Activities (1, 2, or 3)

Work with the National Center for Law and the Deaf/Hearing
paired in bringing legal information, services, and representation to
more than 13 million Americans who are deaf or hearing impa
The Center, a joint program of the National Law Center and the Ga
laudet College, is designed to help make the hearing impaired aware
their legal rights and to assist them in solving their legal and law-
lated problems. Students may participate in one or more projects:
counseling persons with hearing impairments about legal problems;
walk-in clinic usually held on the Gallaudet College campus; (2)
paring and participating in workshops for hearing-impaired persons
acquaint them with their rights and obligations under the law; (3)
sisting in representing the interests of deaf and hearing-impaired
in judicial and administrative proceedings; (4) preparing research
on topics related to law and the deaf, or preparinig handbooks exp
ing legal topics to the hearing-impaired. Students may learn some
language, but will be assisted by trained translators when dealing
deaf individuals. Approximately 60 hours of work per semester
required for each credit hour. Students may repeat this course
maximum of eight semester hours of credit. This course may
taken at the same time as Law 345, or any litigating activities in La
The grade of *CR* (Credit) or *NC* (No Credit) is given for this
(Fall, spring, summer—as arranged)

399 Clinical Law Work (arr.)

Projects involving litigation, research, or public interest activities
legal nature (including aid to indigents, support of public interest
profit corporations, and support of governmental agencies or courts)
be initiated and will be supervised by a faculty member. Projects
approved in advance by the Law Center Supervisory Committee
members) both as to whether the project is appropriate and as to
number of semester hours of credit to be granted. A maximum
semester hours of credit may be taken in one or two semesters.
course is open to a limited number of third-year law students.
CR (Credit) or *NC* (No Credit) is given for this course.
spring)

Advanced Courses

ADMINISTRATIVE LAW: ECONOMIC REGULATION

Faculty Advisers: R.E. Park, G.E. Weston

403 Public Economic Policy and the Law (2)

Interrelation of law and economics in such subject-matter categories
decisional contexts as economic regulation of industry, fiscal policy
ning, government research and development practices, foreign trade
investment, and public spending priorities. (Research Paper)
—evening)

404 **Securities Regulation** (2) Green, Mathews, Klein

State and federal laws governing offering and distribution of securities to the public by corporate issuers and others, regulation of securities markets, rights and liabilities of purchasers under such statutes. Emphasis on statutes administered by Securities and Exchange Commission. (Take-home Examination) (Fall—evening; spring—day)

405 **Regulation of Securities Markets** (2) Pitt, Sonde

Operation of over-the-counter and exchange markets, including competitive and monopolistic practices in each market; relationship of antitrust laws and securities regulations to concept of a free and open market place; role of regional exchanges and third market in providing competitive element in market; advantages and disadvantages of a fragmented market; minimum fee structure, rebates and their effect on merchandising of securities and financial soundness of industry; use and availability of economic data in evaluating performance of market place. The seminar will examine matters directly of interest to graduate law students, lawyers, economists, and political scientists. (Take-home Examination) (Spring —evening)

411 **Administrative Practices and Procedures (Food and Drug Administration)** (2) Rothschild

The study of FDA administrative procedures for the purpose of investigating the significance that administrative practice has on regulatory activity. The course will consider FDA rulemaking procedures in general, a step-by-step consideration of the various hearing procedures now available under the new agency practices and procedures, and problems designed to enable the practical application of rulemaking and hearing procedures to achieve resolution. (Research Paper) (Fall—evening)

412 **Food and Drug Law** (2) Kaplan, Becker

The Federal Food, Drug, and Cosmetic Act, and related laws. Consumer, government, and industry viewpoints. (Choice of Research Paper or Examination) (Spring—evening)

413 **Public Policy and Mass Media** (2) Barron, Secrest

Institutional structure of mass media and their interrelationships; psychological aspects of mass communications; continuing adjustments among public interest goals, the economic system, and technological developments; influence of and controls exercised by government, other institutions, and private groups; conflict between freedom of speech of the media and other major community interests; the media's relationships to the interests of dissident and minority groups and the access of these groups to the media. Barron—(Examination or Research Paper); Secrest—(Research Paper) (Fall—day; spring—evening)

414 **Regulated Industries** (2) Park

Substantive problems of business regulation in terms of natural monopolies, licensed industries, subsidized industries, and safety regulation. Typical problems raised include the role of intervenors, the impact of regulation upon management and market behavior, the uses and abuses of economic evidence, the role of agencies' staffs, interagency planning and regulation, and the effects of judicial and legislative review. Each student selects one industry and develops an insight into economic regulation in terms of that industry's firms, market structure, growth and development, trade associations, and regulatory agencies. (Research Paper)

417 Seminar: Trade Regulation (2)

Group study of current problems relating to unfair trade practices and federal antitrust laws. (Research Paper) (Spring—evening)

Master of Laws candidates in the area of Administrative Law: Economic Regulation who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
372 *Administrative Law*

Other Related Courses

451 *Federal Poverty Legislation*
494 *Use and Control of Nuclear Energy*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
571 *Land Development Planning*

CORPORATION LAW

Faculty Advisers: H.P. Green, R.B. Stevenson, Jr., R.F. Fielding, L.D. Solomon

424 Business Planning (2) Green, Stevenson, Flyer, Lewis, Berk

Integrated study of corporate, financial, tax, accounting, and SEC aspects of the following: organization of a small corporation; organization of a public corporation; stock dividends, recapitalization, and stock repurchases in the context of conflict between active stockholders of a closed corporation and the family of a deceased active stockholder; corporate liquidations; corporate mergers and acquisitions; and divisions of corporations. Prerequisite: Law 312, 336, and 340. Enrollment may be limited by the professor. (Problem Assignments) (Fall and spring—day and evening)

426 Introduction to International Economic Law (2) Stevenson

Principles and processes of international law relevant to transnational economic transactions between private parties, including protection of aliens (individual and corporate) within national legal systems; protection by states of the economic interests of their nationals; act of state doctrine, expropriation, and the protection of alien-owned property; development of international law affecting transnational economic transactions through the decisions of national tribunals and through treaties and international agreements, adjudicatory jurisdiction of municipal tribunals and the enforcement of foreign judgments in the international context; international commercial arbitration; special problems of national and international regulation of transnational business transactions. Law 426 is recommended as a foundation for Law 427. (Examination)

427 Legal Aspects of International Business Transactions (2) Nurick, Stevenson

U.S. law and practice, including current tax problems and U.S. restrictions on investment; brief comparison with British and civil law systems



international law, international contracts, choice of law; currency considerations; effect of SEC laws and regulations; international trade, including GATT and reciprocal trade arrangements; sources of finance, both United States and foreign, private and public, including international organizations; protection of property, settlement of disputes, and selected case studies. In addition to the regular lecturers, there will be guest lecturers in various specialties. Emphasis on current problems in international trade and investment. (Choice of Research Paper or Examination) (Spring —evening)

er of Laws candidates in the area of Corporation Law who have not taken ollowing courses or their equivalent as part of a Juris Doctor or Bachelor aws program should include them in their Master's program.

312 *Corporations*
313 *Sales and Sales Financing*
329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
340 *Taxation—Federal Income, Corporations and Shareholders*

Related Courses

331 *Product Liability*
403 *Public Economic Policy and the Law*
417 *Seminar: Trade Regulation*
431 *Government Procurement Law*
525 *Copyright Law*
526 *U.S. Trademark Law: Selection, Use, Registration, Protection, and Franchising of Trademarks*
540 *Choice of Law and Forum in Transnational Contracts, Techniques of Conflict Avoidance*
555 *Taxation—Special Corporation Problems*
562 *Income Taxation of Foreign Business and Investment*

GOVERNMENT PROCUREMENT LAW

Faculty Advisers: J. Cibinic, Jr., G.J. Ginsburg, R.C. Nash, Jr.

431 **Government Procurement Law** (3) Nash, Cibi

Survey of the law pertaining to government procurement, including a discussion analysis of the unique features of government contracting and a discussion of the functions of Congress, the executive branch, and the courts in the procurement process. Law 355 *Government Contracts* is the substantive equivalent of this course. (Examination) (Fall—evening)

433 **Performance of Government Contracts** (3) Nash, Cibi

Discussion of the substantive legal problems that most frequently arise during the performance of government contracts. Interpretation of specifications and the most generally used contract clauses, and analysis of the rights of the parties when performance in accordance with the terms of the contract is not obtained. (Examination and Problem Assignments) (Spring—evening)

434 **Government Contract Claims and Litigation** (2) Nash, Ginsburg

Analysis of the methods which can be used by the parties to a government contract to obtain legal relief, including detailed coverage of the disputes procedure, actions for breach of contract, and forms of equitable and extraordinary relief. (Examination and Problem Assignments) (Spring —evening)

435 **Seminar: Government Contracts** (2) Nash, Cibinic, Ginsburg

Research and discussion of selected problem areas. (Research Paper) (Spring—day)

Other Related Courses

424 *Business Planning*
427 *Legal Aspects of International Business Transactions*
442 *Labor Standards*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
535 *Negotiation: Concepts and Techniques*

LABOR LAW

Faculty Advisers: J.M. Albert, L.S. Merrifield, D.P. Rothschild C. Johnson

441 **Seminar: Disability Problems** (2)

Workman's compensation law, extension of no-fault principle into motor vehicle area, and national health problems. (Examination) (Fall—evening)

Ginsburg

442 **Labor Standards** (2)

Analysis of the Fair Labor Standards Act, its scope and exemptions, the Civil Rights Act and other labor statutes: the laws establishing minimum standards for government contracts, including the Davis-Bacon Act, Walsh-Healey Act, Service Contract Act, and Work Hours Act; the re-

of the Department of Labor, the Comptroller General, and the contracting agencies in interpretation, administration, and enforcement of these statutes. (Examination) (Spring—evening)

443 **Labor Relations in the Federal Service** (2) **Tobias**

Survey of labor relations in the federal service as governed by Executive Order 11491. Emphasis on the role of the Civil Service Commission, the Department of Labor, the Congress, and the President in the development of collective bargaining relationships between unions and the federal government. (Research Paper) (Fall—evening)

444 **The Individual and The Union** (2) **Gold**

Study of the legal relations between unions and their members with special emphasis on the right to fair representation, the right to union membership, compulsory union membership, the imposition of discipline upon union members, reporting requirements, the conduct of internal union elections, the fiduciary duties of union officers, the imposition of trusteeships, the regulation of racketeering, and political action of unions. Prerequisite: Law 341. (Examination) (Fall—evening)

446 **Equal Employment Opportunity** (2) **Ginsburg**

This course covers the spectrum of federal laws and executive orders relating to all types of discrimination in employment, including Title VII of the Civil Rights Act of 1964, as amended by the Equal Employment Opportunity Act of 1972; the Equal Pay Act of 1963, as amended in 1972; the Age Discrimination in Employment Act; the Civil Rights Act of 1866; the Fourteenth Amendment; the National Labor Relations Act; Executive Orders 11246 and 11375 relating to government contractors (including the "Philadelphia Plan" and other government-imposed "affirmative action" plans and bid conditions, and Revised Order No. 4 relating to sex discrimination). The course includes the substantive and procedural rights available to employees of firms doing business with the government, as well as those of other private firms and state and local government agencies subject to the above federal legislation. (Examination) (Fall—evening)

447 **Seminar: Labor Law** (2) **Merrifield, Chanin**

Group study of contemporary problems of public sector labor law. (Research Paper) (Spring—day and evening)

448 **Seminar: Labor Litigation** (2) **Gold**

(Formerly 449–50 [1–1])

Intensive study of recent Supreme Court and appellate court decisions in the area of labor law; special emphasis on the contrasting variables which influence the respective decision-making processes of the National Labor Relations Board and the courts. Particular attention to labor law cases pending before the Supreme Court for decision during the current term. Analyses of the briefs filed in pending cases; attendance at oral argument; post mortems of the arguments and decisions, with classroom participation by attorneys involved in some cases. Enrollment may be limited. Admission by permission of instructor. Prerequisite: Law 341. (Research Paper) (Spring—evening)

450 **Equal Employment Claims and Litigation** (2) **Hartman**

Litigation in federal court of a claim of employment discrimination; problems faced by attorneys for both plaintiff and defendant; practice in draft-

ing pleadings which the attorneys for the parties would prepare in litigating a claim of employment discrimination. (Examination) (Spring—evening)

Master of Laws candidates in the area of Labor Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

339 *Collective Bargaining and Labor Arbitration*
341 *Labor Law*

Other Related Courses

459 *Problems of the Consumer*
460 *Current Problems in Civil Rights*

LAW AND POVERTY

Faculty Advisers: D.P. Rothschild, J.E. Starrs

451 Federal Poverty Legislation (2)

Students are given a chance to observe at first hand the problems inherent in implementing a federal policy to alleviate poverty through legislation. Students are assigned to work with individual poverty agencies in the District of Columbia on matters relating to the federal funding agencies. Discussions focus on various aspects of poverty law problems lawyers deal with them—from conception of the legislative program, Congressional debate, to administrative policies, to fund distribution, litigation. (Research Paper) (Fall—day)

459 Problems of the Consumer (2 or 3)

Clinical treatment of consumer protection. Minimum of 8 hours commitment each week required; 2-hour weekly class required in addition for 3 credits. Students purchase consumer protection materials as text, and are divided into projects groups. For example, the National Center has negotiated with a commercial TV station to put on a series news spots dramatizing consumer problems and also runs a "Consumer Help Center." This activity involves three groups: (1) a group to work with the station on programming, (2) a group to run the Consumer Help Center, and (3) a research group to investigate the results of complaint intake, referral, and disposition. Other students work in inner-city storefronts, with county government agencies, and on the editorial staff of the *Consumer Protection Reporting Service*. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. May be repeated once for a total credit not to exceed 6 hours. (Fall and spring—day; summer 1978

460 Current Problems in Civil Rights (2)

Uses of law in the effort to achieve racial equality in areas such as discrimination against minority groups and the poor in land use and zoning, (2) school desegregation, and (3) employment discrimination. The class is divided into groups, each dealing with a problem situation in one of these areas. Students represent fictitious clients, write briefs, and argue in class before a student panel of judges, which then writes an opinion. Grades are based on these written and oral presentations, plus

brief critiques of other groups' presentations. Enrollment limited by the instructor. (Problem Assignments) (Fall—evening)

Related Courses

441 *Seminar: Disability Problems*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
560 *Taxation—State and Local*
571 *Land Development Planning*
575 *Community Economic Development*
592 *Seminar: Constitutional Law*

LAW, PSYCHIATRY, AND CRIMINOLOGY

Faculty Advisers: T.F. Courtless, Jr., E. Zenoff, G.M. Caplan

473 **The Crime Lab, the Forensic Scientist, and the Criminal Lawyer** (2) Starrs, Kogan

Designed to acquaint the student with the operations of a modern crime laboratory and the courtroom acceptability of testimony of forensic scientists and other evidence on laboratory test results. Identification of individuals (fingerprints, palmprints, footprints, voiceprints, anthropological reconstruction, hair identification, and serology), identification of objects (ballistics, handwriting, typewriting, fiber identification, paints, varnishes, glass, wood, and paper), toxicology, pathology, forensic use of the microscope and the camera, the coroner and the medical examiner systems, and drug law enforcement. Visual aids, crime laboratory guest lecturers, and field trips to crime laboratories. (Research Paper) (Fall—evening; spring—day)

475 **Law and Criminology I: Search for the Causes of Criminal Behavior** (2) Courtless

Role which criminological knowledge of crime causation may play in assisting lawyers to appraise the effectiveness of various alternative social and legal devices in controlling deviant behavior. The search for factors related to criminal behavior will be developed historically, with emphasis on current causal theories developed by various disciplines. Model as well as operational penal codes, sentencing and probation practices, and specialized facilities will be analyzed in terms of their relationship to such causal theories. (Research Paper) (Fall—day)

476 **Law and Criminology II: Society's Responses to the Criminal Offender** (2) Courtless

Study of the development and current use of society's three major approaches to the handling of offenders: punitive, mechanical, and correctional. Emphasis on society's changing responses to criminal and delinquent behavior, and research findings concerning effectiveness of these responses. Analysis of treatment strategies to facilitate communication between members of the legal profession and behavior scientists charged with effectuating these strategies. Prerequisite: Law 475. (Research Paper) (Spring—day)

477 The Police and the Community (2) Courtless

Problems and potential of contemporary urban law enforcement: the ... and perspective of the police officer; the police *qua* organization: "style ... of law enforcement: law enforcement in the inner city; relationship ... ethnic minorities; civil disorder; police-community relations: methods ... arrest and investigation; complaint review procedures; science and tech... nology in law enforcement; police handling of juveniles; crime and ... statistics. (Problem Assignments) (Spring—day)

479 Seminar: Criminal Practice (2) Foster, Weinst...

Tactical and practical applications of criminal law; mastery of techniques in trying criminal cases. Class sessions built around mock problems based on actual criminal cases; student role-playing as defense attorneys and prosecutors. All phases of criminal trial work covered—client rela... tions, investigation, discovery, trial preparation; particular emphasis ... courtroom techniques—direct and cross examination, impeachment, ... freshing recollection, laying foundations for exhibits, argument, ... courtroom demeanor. Though many of the mock problems are writ... from a defense viewpoint, techniques taught are relevant to both prose... tion and defense. Enrollment limited to 15 third-year and graduate ... dents. Prerequisite: Law 334. Students may elect to receive either ... numerical grade or the grade *CR* (credit) or *NC* (no credit). (Spri... —evening)

480 Law of Criminal Corrections (2) Cros...

Study of two principal areas: (1) sentencing procedures, including pr... bation, parole, and imprisonment; (2) legal rights of prisoners. Enro... ment limited to 25 students. Students who receive credit for Law ... cannot receive credit for Law 478. (Examination) (Fall—evening)

485 Seminar: Health Care Delivery Systems (2) Johns...

Study of the role of the lawyer in existing and proposed national syste... for delivering health care. Students will gain familiarity with the ... cepts and terms in health care delivery by working with issues in ... design, finance, and administration of existing arrangements; examina... of the means of reconciling the expectations of various groups of both ... care service consumers and providers. (Research Paper) (Spring—... evening)

486 Seminar: Law and Psychiatry (2) Zenoff, Ka...

Designed to expose the lawyer to basic constructs of psychiatry an... psychology and to explore their implications in legal rules and practice. ... Psychiatrists and psychologists actively involved in teaching process. ... Topics include psychological testing and other assessment techniques, ... psychiatric evaluations and reports, child custody and other family ... issues, privilege and confidentiality, competency in civil and criminal ... contexts, criminal law matters (including criminal responsibility and ... dispositional issues), civil commitment, right to treatment, right to refuse ... treatment, experimental procedures, and informed consent. Problems of ... counseling, legal ethics, preparation for trial, direct and cross examination, ... and other aspects of practice considered. There is ordinarily at least ... one session in a mental institution. (Research Paper) (Spring—... summer 1978)

Other Related Courses

390 *Law and Medicine*
591 *Legislative Drafting*
592 *Seminar: Constitutional Law*

LAW, SCIENCE, AND TECHNOLOGY

Faculty Adviser: H.P. Green

491 **Computers and the Law** (3) Chandler

A critical study of selected major legal problems presented by new computer technology, including the impact upon legal doctrine and legal institutions. Jurimetrics, the theory of various uses that are and may be made of computers in legal research, the practice of law, and court administration will be examined. Familiarity with the rudiments of computer science or programming would be helpful, but is not required. (Examination)

492 **Seminar: Science and the Legal Process** (2) Green

Reciprocal relationships between law and science; absorption of scientific concepts into substantive law through adjudication, legislation, and rule-making techniques and procedures used in handling, developing, and deciding scientific issues. (Research Paper) (Fall—evening)

494 **Use and Control of Nuclear Energy** (2) Green, Malsch

Development of law and legal institutions to deal with revolutionary scientific developments in nuclear energy. Laws and regulations concerning peaceful uses of nuclear energy, including licensing, safety, environmental, security, and antitrust considerations. (Research Paper) (Spring—evening)

495 **Legal Protection against Technological Hazards** (2) Dembling, Brown

The growth and development of law and legal institutions to protect society against the hazards inherent in new technologies with particular emphasis on the progress of reconciling the protection of the public with the desire for rapid progress. (Research Paper)

Other Related Courses

412 *Food and Drug Law*
413 *Public Policy and Mass Media*
431 *Government Procurement Law*
505 *Intergovernmental Relations I*
508 *Environmental Law I*
509 *Environmental Law II*
531 *International Law of Air and Space*
532 *International Law of the Sea*

LAND USE MANAGEMENT AND CONTROL

Faculty Advisers: J.M. Brown, L.A. Schiller, J.P. Chandler

501 **Land Development Law** (3) Brown

Study of the basic public and private means used by society to manage and control land use, such as zoning, subdivision regulation, pending codes,

eminent domain, and privately contracted conditions, covenants, and re-
strictions. Identification and analysis of emerging new land control proc-
esses and the roles played by public and private entities involved in o
affected by land use management and control efforts at the various eco-
lons of government. Students participate in a game-simulation proce
representing a specific complex situation in land use conflicts involvi
their inherent technological, social, economic, political, and legal elemen
In the model situation students will assume roles as attorneys and wo
with assigned "clients." (Client-oriented written work and class partici
tion.) Enrollment limited by the instructor. (Fall—day; summer 19
Brown, Schi

504 Seminar: Current Problems in Land Use Controls (2)

New and emerging concepts of regionalism considered in the light
actual problem situations and attempts being made by various echelons
government to provide effective and equitable land use management
control. Examination of actual problem areas of major concern, includi
constitutional, administrative, political, judicial, social, economic, and tec
nological elements. Functional planning and decision-making with respe
to selected problem areas and their strategical and tactical transactio
examined within the compass of the broader policy considerations
volved. Guest lecturers; clinical exposure to various government agen
responsible for cooperating with the selected problems. (Research Pape
(Spring—day)
No

505 Intergovernmental Relations I (2)

Study of federalism, emphasizing current techniques for achieving coop
tion and coordination between federal, state, and local governments. D
tailed consideration of devices used, including interstate compacts, gran
in-aid, and exercise of regulatory powers. (Research Paper)
No

506 Intergovernmental Relations II (2)

Advanced seminar on multi-government activities and current topics
intergovernmental relations. (Research Paper)

Master of Laws candidates in the area of Land Use Management and Contr
who have not taken the following courses or their equivalent as part of a J
Doctor or Bachelor of Laws program should include them in their Master
program.

327 *Modern Real Estate Transactions*
372 *Administrative Law*
508 *Environmental Law I*
509 *Environmental Law II*

Other Related Courses

451 *Federal Poverty Legislation*
460 *Current Problems in Civil Rights*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
558 *Taxation—Real Estate and Income*

560 *Taxation—State and Local*
591 *Legislative Drafting*
593 *Seminar: American Legal History*

ENVIRONMENTAL LAW

culty Adviser: A.W. Reitze, Jr.

508 **Environmental Law I** (3) Reitze
(Formerly Law 380)

The National Environmental Policy Act. Water pollution and drinking water protection. This course and Law 509 are recommended for second-year J.D. students interested in this field. (Examination) (Fall—day; spring—evening)

509 **Environmental Law II** (3) Reitze
(Formerly Law 381)

A continuation of Law 508, but designed so that a student can begin with Law 509. Air pollution, noise, toxic substances, solid waste management, and resource recovery. (Examination) (Spring—day)

510 **Water Resources Law** (2) Hedeman
(Formerly Law 502)

Federal/State powers over water; Riparian and prior appropriation doctrines; Indian and reserved rights; groundwater law. Federal programs for water resources development; federal permit programs. Wetland protection and coastal zone management. (Examination) (Fall—evening)

511 **Environmental Planning** (2) Schnidman

Introduction to environmentalism in land use planning, zoning, subdivision controls, growth control. State and Federal land use planning. Case studies of environmentally sound planning. Enrollment limited to 35 students. (Examination) (Fall—evening)

512 **Energy** (2)
(Formerly Law 510)

Federal energy policy. A survey of federal laws controlling petroleum and natural gas. Energy conservation laws. Introduction to electric utility regulation emphasizing production/conservation; rate structures, demand controls. Enrollment limited to 35 students. (Examination) (Spring—evening)

513 **Environmental Litigation** (2) Miller, Steenland
(Formerly Law 508)

Special problems of environmental lawsuits. Topics include pleadings, procedural problems, selection of the proper court, problems of proof, remedies, selection of parties, discovery techniques and trial preparation, and the use of expert witnesses and scientific evidence. Prerequisite: Law 508 (formerly Law 380) or graduate status. Enrollment limited to 35 students. (Choice of Research Paper or Clinical Work) (Spring—evening)

514 **Natural Resources Law** (2)
(Formerly Law 503)

Introduction to public lands; recreation, forestry, grazing, and mining law. Continental shelf development, Alaskan development, western energy development. Wilderness Act, wild and scenic rivers, national trails. Wildlife laws. Soil conservation and surface mining. (Examination) (Fall evening)

516 **Clinical Studies in Environmental Law** (2, 3, or 4)
(Formerly Law 509)

The student works on a project in the environmental law field under the supervision of both the faculty director of the program and a lawyer practicing environmental law. The project may involve working with a government agency, a congressional committee, a private practitioner, or a nonprofit public-interest environmental organization. Admission to the course requires second-semester second-year, third-year, or graduate standing and permission of the Director of the Environmental Law Program. Students who have mastered the fundamentals of environmental law may be selected for this course. Normally this will require completion of at least Law 508 (formerly Law 380). Students may repeat this course for a maximum of 8 semester hours of credit. The grade *CR* (Credit) or *NC* (No Credit) is given for this course. (Fall and spring—day)

Master of Laws candidates in the area of Environmental Law who have not taken the following courses or their equivalent as part of a Juris Doctor or Bachelor of Laws program should include them in their Master's program.

508 *Environmental Law I*
509 *Environmental Law II*

Master of Laws candidates specializing in Environmental Law or Land Use Management and Control may use the following courses to complete the degree requirements.

598 *Research in Public Law*
599–600 *Thesis*

Other Related Courses

413 *Public Policy and Mass Media*
431 *Government Procurement Law*
492 *Seminar: Science and the Legal Process*
494 *Use and Control of Nuclear Energy*
495 *Legal Protection against Technological Hazards*
501 *Land Development Law*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
532 *International Law of the Sea*
560 *Taxation—State and Local*
571 *Land Development Planning*
591 *Legislative Drafting*

PATENT AND TRADE REGULATION LAW

Faculty Advisers: I. Kayton, G.E. Weston

522 **Patent and Know-how Licensing** (2) **Brunsvold**

The business and legal criteria necessary to implement and maintain successful licensing programs; emphasis on the strategy and techniques that permit a proprietor of intellectual property to effectively exploit his status as the owner of a unique form of property. Subject areas covered are business objectives in licensing; legal outline of licensing situations; rights and duties of license parties; factors in selecting which inventions to license—financial, legal, and commercial; finding and selecting the right licensees; determining and negotiating the terms and clauses of the contract; administering and enforcing the license; antitrust and misuse constraints on the business and law of licensing; tax factors affecting the patent and know-how contract; special problems in trade secret, know-how, and show-how contracts; international licensing. Prerequisite: Law 359 and 362, or former Law 360. (Choice of Paper or Examination) (Spring, odd years—evening)

523 **Court Review of Patent Office Decisions** (2) **Dunner**

Procedure and procedural law involved in appealing to the U.S. Court of Customs and Patent Appeals and the U.S. District Courts from administrative decisions in the U.S. Patent Office. Designed to provide an exhaustive step-by-step procedural progression through *ex parte* and *inter partes* patent and trademark appeals. Emphasis on the forms used in the many motions and proceedings before the U.S. Court of Customs and Patent Appeals and the District Courts required to perfect an appeal. Attendance at and critique of actual court proceedings. Introductory material includes administrative appeals before the U.S. Patent Office Board of Appeals. Prerequisite: Law 359 and 362, or former Law 360; or the equivalent in experience. (Examination) (Fall, even years—evening)

524 **Chemical Patent Practice** (2) **White**

Seminar covering patent application preparation, prosecution, appeals, and licensing which are peculiar to chemical patent practice. Prerequisite: Law 359 and 362, or former Law 360; or comparable experience in the practice of patent law. (Examination) (Fall, even years—evening)

525 **Copyright Law** (3) **Moore**
(Formerly 2 credits)

Historical background; formalities and essentials in securing a copyright; subject matter of copyright; remedies; international aspects of copyright under Berne Union, Universal Copyright Convention, Inter-American Convention; copyright licensing and performing rights societies. (Examination) (Spring—evening)

526 **U.S. Trademark Law: Selection, Use, Registration, Protection, and Franchising of Trademarks** (2) **Leeds**

Procedural and substantive law on use, registration, and protection of trademarks, including detailed registration procedure in the U.S. Patent and Trademark Office, common law rights to marks, and licensing and franchising arrangements. Prerequisite: Law 329. (Examination) (Fall, odd years)

528 Patent Interference Practice (2)

Procedure and practice in inter partes determination of priority of inve
tion in the U.S. Patent Office. Topics: conception, reduction to prac
diligence, corroboration, preliminary statements, motions, and
mony practice and final hearing. Also covered are current problem
such as inventor determination, discovery, and privilege. Student
quired to draft procedural document selected from categories of pre
nary statements and various interference motions. Prerequisite:
359 and 362, or former Law 360. (Examination) (Spring, even year

529 Research in Patent, Trademark, and Copyright Law (2)

Prerequisite: Law 417, and related courses; and a *B* average. Reque
writing, with proposed outline of topic of research, must be submitte
the Dean at least one month prior to registration day. Work mus
completed within the semester and paper submitted not later than las
of classes. Graduate students may repeat this course once for credit
the approval of the Dean. (Research Paper)

Master of Laws candidates in the area of Patent and Trade Regulation Law
have not taken the following courses or their equivalent as part of a Juris
tor or Bachelor of Laws program should include them in their Master's prog

329 *Unfair Trade Practices*
330 *Federal Antitrust Laws*
359 *Patent Law*
362 *Patent Office Practice*

Other Related Courses

412 *Food and Drug Law*
417 *Seminar: Trade Regulation*
427 *Legal Aspects of International Business Transactions*
431 *Government Procurement Law*
492 *Seminar: Science and the Legal Process*
562 *Income Taxation of Foreign Business and Investment*

INTERNATIONAL AND COMPARATIVE LAW

Faculty Adviser: International Law—W.T. Mallison

Faculty Advisers: Comparative Law—H.J. Liebesny, G.R. Delaume

531 International Law of Air and Space (2)

Study of the development of international law relating to the use
space and outer space; analysis of air and space treaties in force: the
of various intergovernmental and nongovernmental international orga
tions; consideration of special problems such as liability resulting
space activities, space technology and arms control, and pollution
contamination of outer space; earth resources, sensing, etc. Enro
limited to 25 students. (Research Paper) (Fall—evening)

532 International Law of the Sea (2)

International law affecting allocation of authority over ocean space.
velopment of international law concerning territorial sea, contiguous

high seas, continental shelf, and deep seabed. Current legal and policy issues associated with these areas. (Examination) (Spring—evening)

533 **Legal Regulation of International Coercion** (2) Mallison, Jabri

Process of legal decision during war and at times when expectations of violence are high—contemporary international law of war and coercive measures short of war, such as limited naval blockade; legal aspects of modern methods of coercion—economic, political, psychological, and military; limited war and modes of preventing "escalation" to total war; regulation of hostilities including protection of war victims, civilian persons, and prisoners of war; war crimes and punishment; problems concerning weapons of mass destruction; legal control of terra; and problems of transforming coercion situations to minimum order ones. (Research Paper) (Spring—day)

534 **U.S. Foreign Relations Law** (2) Chandler

Seminar involving the study of foreign relations law. Materials to be read and discussed relate to the Constitutional and other public law problems which arise in the development and conduct of U.S. foreign relations. (Research Paper) (Fall—evening)

535 **Negotiation: Concepts and Techniques** (2) Ramundo, Tankel

Role of the lawyer and policy maker (client) in private, intragovernmental, and international negotiations; negotiations in private practice and governmental operations; achievement of consensus among contentious parties; negotiating techniques, including effective use of the "fallback"; gaming exercises in the actual conducting of negotiations, with practical work in the preparation of claim letters, agency and national positions, and negotiating instructions. Enrollment limited by the instructors. (Writing Assignments) (Spring—evening; summer 1978)

536 **Diplomatic and Consular Law and Practice** (1) Mitchell

Development of diplomatic and consular relations between nations; legal rights, privileges, functions, and immunities of diplomatic and consular personnel; extent of immunity from jurisdiction of foreign government missions and representatives; problems of taxation affecting foreign government missions and personnel. (Research Paper) (Fall—evening)

537 **The International Law of Human Rights** (2) del Russo

Theory of fundamental freedoms from its philosophical to its legal formulation in the American and French Revolutions, the individual vis-a-vis the State, human rights as rights against the national government, the emerging of the individual in the law of nations as a subject of rights and duties, the individual as subject of international concern, social and political forces stressing the need for international recognition and protection of human rights, the setting of human rights standards. The Universal Declaration and its influence over the law of nations, critical assessment of the work of the UN in the human rights field, regional approach to the international protection of human rights, analysis of the case law of the European Convention, human rights in the Inter-American system, state sovereignty and the international protection of human rights, a comparative approach to human rights protection at the national level, due process and freedom of speech in light of different legal systems. (Research Paper) (Fall—day)

Delaume

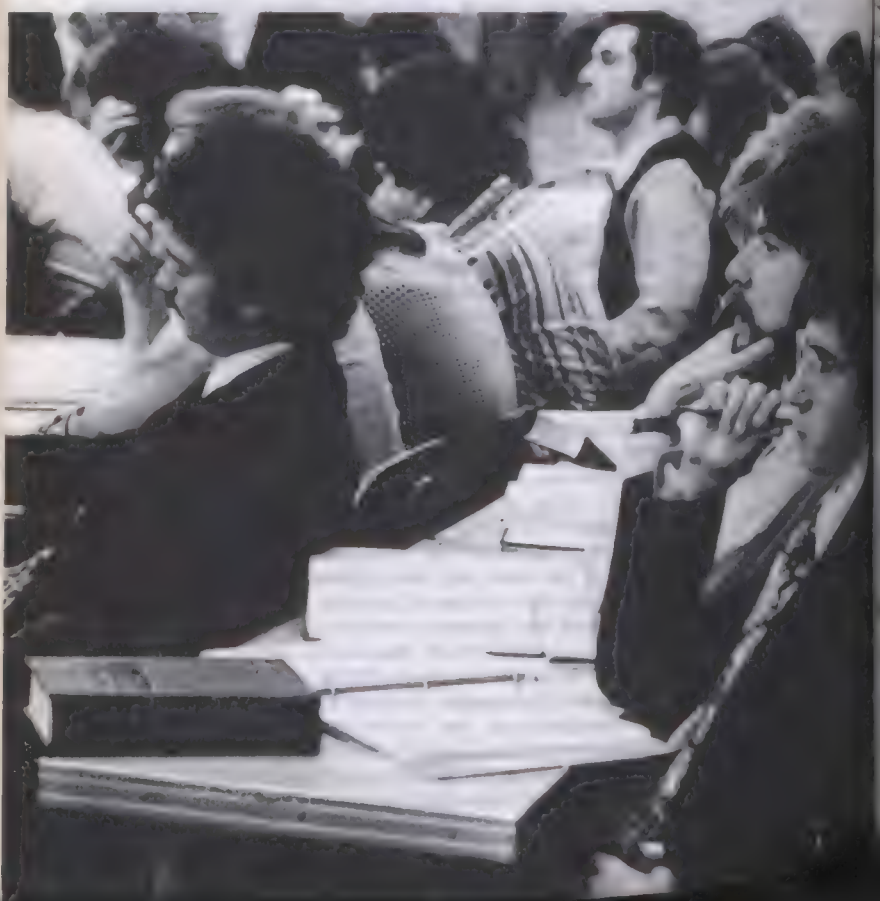
540 Choice of Law and Forum in Transnational Contracts, Techniques of Conflict Avoidance (2)

Problems confronting the practitioner who endeavors to anticipate conflicts before they arise. Conflicts rules for transnational contracts; internationalization of contracts involving sovereign and international organizations. Techniques of conflict avoidance; express choice of law; conflict avoidance in absence of express stipulation of applicable law. Effectiveness of conflict avoidance; interrelationship of conflicts law and comparative law. (Research Paper) (Spring—evening)

Johnson

542 U.S. Regulation of International Trade (2)

Study of theory and practical application of United States laws, regulations, and governmental infrastructure affecting international trade. Public international fora and agreements influencing U.S. regulation, e.g. GATT, the MTN, UNCTAD, and treaties of friendship, commerce, and navigation; constitutional basis for U.S. government regulation of international trade; exemplary areas of trade regulation: Export Administration Act, foreign assets control, tax, Foreign Corrupt Practices Act, Arab boycott regulations, antitrust, countervailing duties, import relief for domestic industries, East-West trade, generalized system of preferences and tariff nomenclature. (Examination) (Spring—evening)



546 **Soviet Law (2)** **Ramundo**

Concept of "socialist legality"; legal relationship of individual to state and other participants in Soviet society; role of Party in Soviet legal system; Soviet philosophy of law; state (constitutional) law: Soviet federalism, governmental apparatus, rights and obligations of citizenship; criminal law; property law; labor law; selected topics in civil law and procedure; international law. (Choice of Paper or Examination) (Fall—evening)

547 **Chinese Law (2)** **Hsia**

Emphasis on the legal system of Communist China; analysis of the constitutional law of the People's Republic of China, including general principles, state structure, and rights and duties of citizens; a brief survey of the administration of justice—courts, procuratorates, and lawyers; marriage law; land law; counterrevolutionary act and other criminal statutes; principles of civil law; Communist Chinese concept of international law. (Research Paper)

548 **Law of the Near East (2)** **Liebesny**

Law of the Arab countries, Turkey, and Iran, including basic principles of Islamic law, analysis of the present day codes, and investigation of the Western influences on laws of these countries. (Examination)

ter of Laws candidates in the area of Public International and Comparative w who have not taken the following courses or their equivalent as part of a a Doctor or Bachelor of Laws program should include them in their Mas- program.

302 *Admiralty*
303 *International Law and World Order*
304 *United Nations Law and World Order*
307 *Comparative Law*
309 *Conflicts of Laws*

Related Courses

427 *Legal Aspects of International Business Transactions*
494 *Use and Control of Nuclear Energy*
505 *Intergovernmental Relations I*
506 *Intergovernmental Relations II*
562 *Income Taxation of Foreign Business and Investment*

TAXATION

Advisers: J.R. Hambrick, D.B. Weaver, R.F. Fielding, L.D. Solomon

551 **Taxation—Partnerships and Subchapter S (2)** **Weaver, Sanders**

Income tax problems of partnerships and tax-option corporations (Subchapters K and S of the Internal Revenue Code of 1954). Prerequisite: Law 336. (Examination) (Spring—evening)

553 **Seminar: Estate Planning** (2) Weaver, McCoy, Gallighe

Study of the effective disposition of wealth by inter vivos gift and testa mentary transfer; emphasis on income, estate, and gift tax considerations use of the trust form in the transfer of wealth; use of insurance and jointly held property as part of the estate plan; planning for the continu ation or disposition of the client's business interests. Preparation of a estate plan, with supporting documents is the major project for the course Prerequisite: Law 325, 326, 336, and 338. Enrollment limited by instructor. (Problem Assignments) (Spring—evening; summer

Chai

554 **Taxation—Deferred Compensation** (2)

Tax and labor law consequences of deferred compensation. Examina tion of new standards imposed by Employee Retirement Security Act 1974. Consideration of tax consequences of "unqualified" plans, lump sum distributions, individual retirement accounts, and new requirement that defined benefit plans be insured by the Pension Benefit Guaranty Corporation. Prerequisite: Law 336. (Problem Assignments and Exam nation) (Fall—evening)

Libin, Da

555 **Taxation—Special Corporation Problems** (2)

Detailed study of the principal federal tax benefits of the corporate form of doing business. Consideration of problems involved in the tax planning of the corporate structure and corporate operation, including the tax defi nition of a corporation, the special deductions available to corporate payers, the compensation of the corporate executive and employee, the debt-equity question, the accumulated earnings tax, the personal holding company tax, multiple corporations, and consolidated returns. Survey of the types of corporations receiving special treatment under the Internal Revenue Code, such as financial institutions, real estate investment trusts, regulated investment companies, cooperatives, and small business corpora tions. Prerequisite: Law 340. (Research Paper) (Spring—evening

Hopki

557 **Taxation—Exempt Organizations** (2)

Tax-exempt organizations: policy and practice of preferred tax treatment for selected organizations and gifts to them. Statutes, regulations, and IRS practice; legislative origins, judicial interpretations, and policy con sideration. Tests of qualification, disqualification, and limited tax prefer ence. Mechanics of securing and retaining exemption; qualified execu tion; unrelated business income; private inurement, political activity. Pe nial or loss of exemption. Return and reporting requirements. Comparative tax treatment of nonexempt and nonprofit organizations. Special sanctions with respect to private foundations, managers, and donors for improper, excessive, or prohibited activities. Enrollment may be limited Prerequisite: Law 336. (Examination) (Fall—evening)

Tuch

558 **Taxation—Real Estate and Income** (2)

The effect of income taxes on the real estate market and real estate transactions: sales and exchange of real estate interests; various entities for the ownership and development of real estate; the impact of taxes on the landlord and tenant; the impact of taxes on the mortgagor and mortgagee, including the choice of financing techniques, such as the sale-leaseback; depreciation, amortization, and obsolescence; basis and basis adjustments; and casualties and other involuntary conversions. Prerequisite: Law 336 (Examination) (Spring—evening)

Hambric

559 **Taxation—Oil and Gas** (2)

Application of federal income tax law to producing segment of oil and

gas industry. Classification of interests; treatment of exploration and development expenditures. Depletion allowance and concept of "economic interests." Sales vs. "leasing" transactions. Organization problems. Prerequisite: Law 336. (Examination)

560 **Taxation—State and Local** (2) Field

Taxation by state and local governments; problems of real and personal property taxation, sales and use taxes, business and personal income taxes. Limitations on taxation of interstate commerce. Congressional problems. (Choice of Research Paper or Examination) (Spring—evening; summer 1978)

562 **Income Taxation of Foreign Business and Investment** (2) Hambrick

The provisions and policies of the federal income tax law applicable to foreign income, including considerations affecting the choice of methods of engaging in foreign business and investment, treatment of controlled foreign corporations, allocation of income in foreign commerce, credit for foreign taxes, principles and trends of U.S. tax treaties. (Examination)

564 **Seminar: Special Problems of Tax Policy** (2) Field, Singer

Intensive study of selected aspects of the tax structure with primary attention given to the federal income tax. Problem areas are reviewed primarily from the standpoint of tax policy, including legal, economic, social, and practical considerations. Alternative solutions, including current legislative proposals, are examined. Prerequisite: Law 336, 340. (Research Paper) (Fall—evening)

567 **Seminar: Tax Practice and Procedure** (2) Muoio, Lewis

Review of the major areas of tax practice, including organization of the Internal Revenue Service, legislation, administrative regulations, tax planning, tax rulings, tax audit, settlement procedures, claims for refund, tax collection processes, criminal tax practice, and ethical problems in tax practice. Preparation of various documents is required. Prerequisite: 5 semester hours of taxation, including Law 336. (Problem Assignments) (Fall—evening)

568 **Seminar: Federal Tax Litigation** (2) S. Cohen, London

Choice of forum. Conduct of civil tax cases: trial practice in the Tax Court, the District Courts, and the Court of Claims; appeal practice in the Courts of Appeals and on certiorari to the Supreme Court; analysis and drafting of pleadings, motions, and briefs; oral argument; settlements and stipulations of fact. Comparative responsibilities and procedures of IRS and of the Department of Justice for litigation control. Prerequisite: Law 567. (Writing Assignments) (Spring—evening)

ter of Laws candidates in the area of Taxation who have not taken the fol-ng courses or their equivalent as part of a Juris Doctor or Bachelor of program should include them in their Master's program.

336 *Taxation—Federal Income*
338 *Taxation—Federal Estate and Gift*
340 *Taxation—Federal Income, Corporations and Shareholders*
351 *Law and Accounting*

Other Related Courses

404 *Securities Regulation*
424 *Business Planning*
427 *Legal Aspects of International Business Transactions*

URBAN LEGAL STUDIES

Faculty Advisers: M. Pock, D.P. Rothschild

571 Land Development Planning (2 or 3) McGrath,* Schnidm

Selected problems in urban and regional planning: applications of zonin urban renewal, and special programs available for the implementation development plans. Enrollment limited by the instructor. (Examinatio and Paper) (Fall and spring—evening)

575 Community Economic Development (2) Stevens

A substantive study of the organizational, financial, and tax-planning p pects of nonprofit, cooperative, and small business organizations. Pro lems illustrating some of the legal considerations of a nonprofit orga zation and a small business. Consideration of the problems of econo development and current efforts to stimulate it. Enrollment limited 25 students. Prerequisite: Law 312, 336. (Problem Assignments)

579 Clinical Studies in Urban Law (2, 3, or 4) Sirulnik, Sm

Open to second- and third-year students. Participants work in th National Center's Community Legal Clinic, a diverse legal service institu tion offering a variety of litigation and nonlitigation advocacy opportun ties in civil representation. Under the supervision of the Director and re attorney-instructors, such skills as interviewing, counseling, drafting, n gotiations, civil litigation, and administrative practice are learned while serving various segments of the city's low-income populace, includi representing the elderly through a special program. Third-year studen are eligible to participate in the course as student litigators in the Di trict of Columbia Superior Court. Students may also earn credit workin for other public interest law institutions or government agencies. St dents who perform 10 hours' service each week for the semester receiv 2 semester hours of credit; those performing 15 hours' service receive semester hours; those performing 20 hours' service receive 4 semest hours. May be repeated for credit not to exceed 8 semester hours. The course may not be taken at the same time as Law 345, or any litigation activities in Law 346. The grade of *CR* (Credit) or *NC* (No Credit given for this course. (Fall, spring, summer 1978)

Descriptions for the other courses in this area (listed below) appear elsewhere in "Advanced Courses."

451 **Federal Poverty Legislation** (2)
459 **Problems of the Consumer** (2 or 3)
501 **Land Development Law** (3)
505 **Intergovernmental Relations I** (2)
506 **Intergovernmental Relations II** (2)
560 **Taxation—State and Local** (2)

* Dorn Charles McGrath, Jr., is Professor of Urban Planning and Chairman of the Department of Urban and Regional Planning in the School of Government and Business Administration.

Other Related Courses

460 *Current Problems in Civil Rights*
475 *Law and Criminology I: Search for the Causes of Criminal Behavior*
476 *Law and Criminology II: Society's Responses to the Criminal Offender*
592 *Seminar: Constitutional Law*

OTHER ADVANCED COURSES

586 **Immigration Law** (2) — **Mancini**

Law and practice under the McCarran-Walter Act, involving questions of immigration, emigration, expatriation, nationality and naturalization. Consular, Immigration and Naturalization Service, and Labor Department practice. (Examination) (Fall—evening)

588 **Legal Problems in Education** (2) — **Long, Smalls**

Public policy issues involving individual liberties and governmental obligations examined in the context of government's participation in education. Issues covered include legal framework within which states regulate schools, rights of students and teachers, obligations to avoid discrimination and provide equal educational opportunities, and role of courts, legislators, and educational officials in resolving such issues. (Research Paper) (Spring—day)

591 **Legislative Drafting** (2) — **Zweben**

Advanced instruction and practice in legislative drafting; overview of legislative process with emphasis on legislative drafting. Enrollment limited to 30 students. (Problem Assignments) (Spring—evening)

592 **Seminar: Constitutional Law** (2) — **Green, Silard**

Group study of contemporary problems in constitutional law; process of constitutional litigation; problems of effectuating constitutional guarantees. (Research Paper) (Fall—day)

593 **Seminar: American Legal History** (2) — **Lowther**

From the outbreak of the Revolution at Lexington and Concord to the death of John Marshall. An examination of men, events, and movements significant in the unfolding of our laws and legal institutions in this formative period of our national life, including a critical examination of the place of the lawyer in a revolutionary age. Comparison of the role of the lawyer during the politically and socially unsettled time of Marshall with the role of the lawyer in today's troubled scene. Members of the seminar present the results of their research and thought either by oral or written reports. The grade of *CR* (Credit) or *NC* (No Credit) is given for this course. (Problem Assignments) (Fall—as arranged)

594 **Professional Responsibility** (2) — **Sharpe, Upton**

Ethical problems in civil and criminal litigation. Loyalty to the client. Financing of legal services. Etiquette of acquiring and retaining clients. Procedures and problems in legal discipline. Special responsibilities of the

government lawyer. Ethical conduct of judges. Issues in *pro bono publico* practice. Ethical responsibilities of law professors. Plea bargaining. Role of the American Bar Association. Sharpe (Examination); Upton (Report and Paper) (Spring—day and evening) Staff

597 Independent Studies (arr.)

Limited to teaching fellows. The proposed program of study must be submitted to a faculty member in writing and approved prior to the beginning of the semester. May not be elected for more than 12 semester hours of credit. (Fall and spring) Staff

598 Research in Public Law (2)

Limited to graduate students with at least a *B* average who have had a seminar or comparable course in field of proposed research. Students are responsible for obtaining an adviser from the full-time faculty who is willing to sponsor their research. This adviser's name must be submitted to the Dean at registration. Work must be completed within the semester. Students may repeat this course once for credit with the approval of the Dean. (Research Paper) (Fall, spring, summer)

599–600 Thesis (2–2)

Students must register for two successive semesters. It is recommended that they not register for both sections in one semester. (Fall, spring, summer)

SPECIAL PROGRAMS IN RESEARCH AND INSTRUCTION

ENVIRONMENTAL LAW PROGRAM

ector A.W. Reitze

e Environmental Law Program seeks to provide both academic and clini- experience in the environmental law field. The program is predicated on an hange of information and experience between the academic community and world of the practicing attorney. The result is a forum for presentation, cussion, and implementation of legal avenues to cope with the critical en- nmental issues of the present and future generations. These goals are ieved through courses, seminars, research projects, and clinical activities.

GOVERNMENT CONTRACTS PROGRAM

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comprehensive government contracts program provides continuing instruc- for industry and government personnel in this field and a program of ses leading to the Master of Laws degree in Government Procurement . The program includes (1) short seminars, (2) one-week courses in ad- ced problems in the field, (3) an annual institute treating a problem of mporary importance, (4) an annual conference in a major area, (5) com- tion of materials for use in current courses, (6) publication of a series of nographs treating special problems in the field, and (7) special research jects.

INTERNATIONAL AND COMPARATIVE LAW PROGRAM

ector W.T. Mallison
ociate Director H. J. Liebesny

e objectives of the International and Comparative Law Program are to pro- e insights into the processes of international law and foreign legal systems. ific objectives in international law are to provide a better understanding

of decision-making, sanction processes, legal institutions, and the relationships between domestic and international law. Specific objectives in comparative law include understanding of the basic institutions of civil law countries, the reception of civil law and common law in non-Western countries, and the role of decisional law and judicial review in selected legal systems. Improvements which are needed to promote the rule of law in the world community are also considered. International aspects of business transactions and economic development are included in the Program. The objectives of the Program are implemented through course work and seminars for both J.D. and post-J.D. degree students and through research and writing in pertinent fields.

LAND USE MANAGEMENT AND CONTROL PROGRAM

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The social, economic, technological, political, and legal interrelationships generated by the fact that land is a basic, limited-supply natural resource, capable of being subjected to differing but concurrent public and private uses, raise a growing number of issues involving management policy and control measures which are of critical concern to the future of the nation. The Land Use Management and Control Program, through a combination of academic, clinical, and game-simulation processes, seeks to provide an understanding of existing and pending problems, needs, means, and opportunities for solution with respect to this developing area of national concern.

LAW, SCIENCE, AND TECHNOLOGY PROGRAM

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The Law, Science, and Technology Program deals with the reciprocal relationships between law and science, providing courses, seminars, research studies, and publications to equip the legal profession to deal more effectively with the social, economic, political, and legal consequences of the nation's present massive commitment to scientific progress.

PATENT LAW PROGRAM

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The Patent Law Program is designed for students in the J.D. and Post-J.D. degree programs whose intentions are to specialize in the practice of patent law. During the past eight years an organized program has been developed to offer as complete and as integrated a collection of courses in patent law as possible. The course offerings in patent law now total 17 semester hours, far more than any other law school in the United States. In addition, courses in trademark and copyright law are also available (see the "Patent and Trade Regulation Law" area of specialization in the "Advanced Courses" section of this bulletin for a complete list and detailed description of the patent law courses offered). The object of the Patent Law Program is to provide the student with a concentration in patent law at a level of specialization and maturity which will enable advancement more rapidly in this field.

THE GEORGE WASHINGTON LAW ASSOCIATION

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HE GEORGE WASHINGTON LAW ASSOCIATION was founded in 1912 and has been filiated with the General Alumni Association since 1926. Its purposes as ated in the constitution are to promote high standards of legal education, to ep the alumni of the school in close touch with one another, especially with mbers of their own classes, to gather and publish at intervals information as the whereabouts and activities of these alumni, and to further the interests the school.

Eligible members are those who have matriculated in the school or National iversity and have left in good standing, and any member or former member the faculty of the school. Active members are those eligible members who e current contributors to the Law Annual Support Program of the University d life members of the George Washington Law Association.

The Association plans publication periodically of the Law Alumni Directory. w alumni are urged to keep the Alumni Office informed of their where-outs so that directory information can be kept up to date.

The Law Alumni Office is in the University Library, 2130 H Street, N.W., shington, D.C. 20052.

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THE UNIVERSITY

HISTORY AND ORGANIZATION

HE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columian College in the District of Columbia. The name of the institution was anged in 1873 to Columbian University and in 1904 to The George Washgton University. The debt of the University to George Washington, whose me it bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insisted on the establishment of a National University in the Federal City. There he ged that, while being instructed in the arts and sciences, students from all rts of the country would acquire the habits of good citizenship, throwing off al prejudices and gaining at first hand a knowledge of the practice, as well as e theory, of republican government. To further the materialization of his pes, Washington left a bequest of fifty shares of The Potomac Company "tords the endowment of a University to be established within the limits of the strict of Columbia, under the auspices of the General Government, if that vernment should incline to extend a fostering hand towards it." The Conress never extended "a fostering hand." The Potomac Company passed out of istence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a great ssionary urge and the need for a learned clergy, a group of dedicated minsters and laymen sponsored a movement for the establishment of a college in e District of Columbia. Inspired largely by the zeal and energy of the Revernd Luther Rice, they raised funds for the purchase of a site and petitioned ngress for a charter. After much delay and amendment, Congress granted a arter which was approved by President Monroe on February 9, 1821. To feguard the College's nonsectarian character it provided "that persons of ery religious denomination shall be capable of being elected Trustees; nor all any person, either as President, Professor, Tutor or pupil, be refused adittance into said College, or denied any of the privileges, immunities, or adntages thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian College, activities were centered on College Hill, a tract of forty-six and a half acres tween the present Fourteenth and Fifteenth Streets extending north from Flor Avenue to somewhat beyond Columbia Road. The Medical School was tained downtown. For the better part of the Columbian University period, the

buildings of the University were situated along H Street between Thirteenth and Fifteenth Streets.

During the last half century the University's present plant has been developed in that section of the old First Ward familiarly known as "Foggy Bottom," between Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue. The area contains several reminders of historic interest to the University. President Monroe, who signed the Charter, lived at 2017 Eye Street. The first President of the Board of Trustees, the Reverend Obadiah B. Brown, was for five years the pastor of a church at Nineteenth and Eye Streets, and Washington selected Twenty-third and E Streets as the site of the National University he had hoped to see established.

The University as it is now organized consists of Columbian College of Arts and Sciences (undergraduate); the Graduate School of Arts and Sciences; the professional schools, which include the National Law Center and the schools of Medicine and Health Sciences, Engineering and Applied Science, Education, Government and Business Administration, Public and International Affairs; the College of General Studies; the Division of University Students; the Summer Sessions; and the Division of Experimental Programs.

The George Washington University is privately endowed and is governed by a self-perpetuating Board of Trustees of which the president is an ex officio member.

ACADEMIC STATUS

The George Washington University is accredited by its regional accrediting agency, the Middle States Association of Colleges and Secondary Schools. The University is on the approved list of the American Association of University Women and is a member of the College Entrance Examination Board.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the United States Information Agency, the Corcoran Gallery of Art, the Department of State, the Department of the Interior, the General Services Administration, the National Academy of Sciences, and the Kennedy Center for the Performing Arts.

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	1st year	2nd year	3rd year	4th year	Graduate	Other
Day	315	322	315	.....	22	5
Evening	100	95	100	104	230	50

Total: 1,685

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ciate in Arts in General Studies (A.A. in Gen.Std.), Associate in Science
Cartographic Science (A.S. in Cart.Sc.), Associate in Science in Geodesy (
in Geod.), Bachelor of Arts (B.A.), Bachelor of General Studies (B.Gen.St
Bachelor of Science (B.S.), Bachelor of Science in Cartographic Science (
in Cart. Sc.), Bachelor of Science in Geodesy (B.S. in Geod.), and Bachelor
Science in Oceanography (B.S. in Ocea.)

GRADUATE SCHOOL OF ARTS AND SCIENCES: Master of Arts (M.A.), Master
Arts in Special Studies (M.A. in Sp.Std.), Master of Fine Arts (M.F.A.), M
ter of Forensic Sciences (M.F.S.), Master of Music (Mus.M.), Master of S
ence (M.S.), Master of Science for Teachers (M.S. for Teachers), Master
Science in Forensic Science (M.S.F.S.), Master of Science in Special Studi
(M.S. in Sp.Std.) and Doctor of Philosophy (Ph.D.)

SCHOOL OF MEDICINE AND HEALTH SCIENCES: Associate in Science (A.S
Bachelor of Science (B.S.), Bachelor of Science in Health Science (B.S.
H.Sc.), and Doctor of Medicine (M.D.)

NATIONAL LAW CENTER: Juris Doctor (J.D.), Master of Laws (LL.M.), M
ter of Comparative Law (M.Comp.L.), Master of Comparative Law (Amer
can Practice) (M.Comp.L. (Am.Prac.)) and Doctor of Juridical Science
(S.J.D.)

SCHOOL OF ENGINEERING AND APPLIED SCIENCE: Bachelor of Science (Civil E
gineering) (B.S. (C.E.)), Bachelor of Science (Electrical Engineering) (B.S.
(E.E.)), Bachelor of Science (Mechanical Engineering) (B.S. (M.E.)), Mas
ter of Engineering Administration (M.E.A.), Master of Science (M.S.), Ele
neer (Engr.), Applied Scientist (App.Sc.) and Doctor of Science (D.Sc.)

SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT: Bachelor of Arts in Edu
tion (B.A. in Ed.), Bachelor of Science in Human Kinetics and Leisure Stu
ies (B.S. in H.K.L.S.), Master of Arts in Education (M.A. in Ed.), Master
Arts in Teaching (M.A.T.), Education Specialist (Ed.S.) and Doctor of Ed
cation (Ed.D.)

SCHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION: Bachelor of Busi
Administration (B.B.A.), Bachelor of Science in Administration (B.S. in Ad
Bachelor of Science in Health Care Administration (B.S. in H.C.A.), Mas
of Arts in Health Care Administration (M.A. in H.C.A.), Master of Busi
Administration (M.B.A.), Master of Public Administration (M.P.A.), Ma
ter of Science in Administration (M.S. in Adm.), Master of Urban and Re
gional Planning (M. of Urb. and Reg.Plan.), Post-Master's Graduate Cer
cate in Health Care Administration (Grad.Cert. in H.C.A.), Doctor of Bu
ness Administration (D.B.A.) and Doctor of Public Administration (D.P.A

SCHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS: Bachelor of Arts (B.A
Master of Arts (M.A.) and Master of Science in International Affa
(M.S.I.A.)



ORGE WASHINGTON UNIVERSITY BULLETIN
XXVII, No. 4, June, 1978

OF ENGINEERING AND APPLIED SCIENCE

THE GEORGE
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THE GEORGE WASHINGTON UNIVERSITY BULLETIN

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE 1978–1979

WASHINGTON, D.C. 20052

TO ALL PROSPECTIVE STUDE

The School of Engineering and Applied Science has been in contin session since 1884, and offers programs of study leading to Bache Master's, Professional, and Doctor's degrees. Its prime objective is to velop in the student the precious asset of a well-trained mind which ma applied to the attainment of our many national objectives. In these cha times, it is necessary to search for quality. Students and faculty have the portunity of assisting in the planning and implementation of educationa grams. Examination is made periodically of the School's objectives and they relate to those established by the Engineering Council for Professiona velopment (ECPD). Emphasis includes such items as the student's basic advanced levels of education and role in present and future society.

This catalogue describes the programs and requirements for undergrad and graduate study in the School of Engineering and Applied Science and cludes information on the Cooperative Education Program in Engineering the Joint Institute for Advancement of Flight Sciences (JIAFS).

The Cooperative Education Program in Engineering provides the graduate engineering student with the opportunity to obtain an enduring dation in engineering education by combining academic learning with prac first-hand experience in the student's chosen field of engineering. The stud earnings will help to pay for a major part of the cost of an engineer education.

JIAFS was created by the joint efforts of the NASA-Langley Research Ce and the School of Engineering and Applied Science. The education and search opportunities offered in the program combine the academic resources George Washington University and the professional research resources facilities of NASA-Langley Research Center to prepare qualified graduate dents for careers in research, development, design, and teaching.

The School of Engineering and Applied Science is a professional schoo a university comprised of eight degree-granting schools and colleges environment of the nation's capital is very favorable for the intellectual cultural development of the student. The metropolitan Washington area tains the second largest concentration of research and development in United States, and the engineering component of this activity is subs extensive, offering many employment opportunities to students after graduat

The atmosphere of the School is one of serious-minded effort toward m development. Being a small school, it recognizes the individual as the most important element in the educational process. The student body, u graduate and graduate, has a primary interest in design, research, develop and management in both scientific and engineering activities. Many alumni the School are successfully engaged in all fields of engineering—in scien management, government, and education.

The philosophy of the School, which might be summarized as "educa for creativity, not conformity," has through the years reflected the many ra and profound changes in the engineering profession.

The faculty of the School and I look forward to a closer and more pro relationship with you. If you need additional information, please do not he to call upon the department chairmen or me.

HAROLD LIEBOWITZ
Dean

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August 28	Orientation for new students from foreign *Monday*
August 29	Orientation and placement tests for all new uate students *Tuesday*
August 29–30	Advising for all students *Tuesday–Wednesday*
†*August 31–September 2*	Registration—Tompkins Hall of Engineering *Saturday*
	Application for February graduation due as part istration
September 4	Labor Day (holiday) *Monday*
September 5	Classes begin *Tuesday*
November 1	Application for spring semester financial aid due *day*
November 17	D.Sc. dissertations of February candidates due
November 22	Thanksgiving recess begins after last class
November 27	Classes resume *Monday*
December 1	Master's theses of February candidates due
December 5	Last day of fall semester classes *Tuesday*
December 11–20	Examination period *Monday–Wednesday*

1979	SPRING SEMESTER
January 8	Orientation for new students from foreign *Monday*
January 9	Orientation and placement tests for all new ate students *Tuesday*
January 9–10	Advising for all students *Tuesday–Wednesday*
†*January 11–13*	Registration—Tompkins Hall of Engineering *Saturday*
	Application for May graduation due as part of tion
January 15	Spring-semester classes begin *Monday*
February 1	Deadline for submission of 1979–80 freshman financial aid applications *Thursday*
February 19	Winter Convocation (holiday) *Monday*
March 1	Deadline for submission of 1979–80 continuing transfer undergraduate student financial aid ap *Thursday*
March 10	Spring recess begins after last class *Saturday*
March 19	Classes resume *Monday*
March 23	D.Sc. dissertations of May candidates due
April 1	Deadline for submission of Summer Sessions and 80 graduate financial aid applications *Sunday*
April 7	Master's theses of May candidates due *Saturday*
April 20	Last day of spring semester classes *Friday*
April 26–May 5	Examination period *Thursday–Saturday*
May 6	Commencement *Sunday*

* This calendar is subject to change.
† The registration procedure and hours of registration will be stated in the *Schedule* which is available well in advance of each semester.

1978

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THE STUDY OF ENGINEERING

The Meaning of Engineering and Applied Science

THE RESPONSIBILITIES AND ACTIVITIES of the engineering profession ext into every aspect of industry and research and into many fields of comm and the arts. Engineers face problems in the production and distribution o types of manufactured products, including the design of mechanical, electr and chemical processes, of equipment, and of plants in which such products made; in the design and construction of a variety of structures such as bri tunnels, harbors, and dams; in aircraft design and construction, including plicated electronic equipment for control, guidance, and communication; in operation of transportation systems; in the automotive industry; in the ma and space programs; in energy resources and power and in the generation transmission of power; in modern communication; in traffic control; in city p ning; in public health and sanitation as it affects the environment; and ventilation and refrigeration. This list of applications is far from exhaustiv does indicate, however, that engineering is a broad profession in which t are many opportunities to specialize.

The Relationship of Engineering and Science

In any discussion of engineering and applied science, it is important to emp size the distinction between engineering and science. The President's Scien Advisory Committee points out that the engineer and scientist each play important role on a team: "The scientist is one who seeks to extend boundaries of knowledge in his chosen field. The engineer has the task combining the knowledge of science with a knowledge and awareness of needs and limitations of human beings and of a human society to deve and create things for human use. . . . While scientists have uncovered basic knowledge, it is the engineers who have created the tangible tools, rials, and products that have revolutionized our daily lives, our commu living, and our national defense."

The work of engineers is a focal point at which scientific knowledge, the of such knowledge as a service to society, financial considerations, human sources, and society's needs are interrelated. The engineer is concerned, the fore, with the means for operating a dynamic society, and must consider only whether the knowledge that exists will enable the creation of a worka product, but also how the product can be built, who will use it, and how s use will affect the environment in which it will operate.

The Professional Engineer

Engineers are concerned with the quality and preservation of human life. E gineer, as the term is used in this bulletin and as it is commonly understo in our society, refers to the person who makes use of the advances of scien and technology in an economically feasible manner for the benefit of socie This process is complex and challenging. Although the content of engineering curricula is certainly scientific, the engineer has not lost a sense of purpos in serving as an intellectual agent in the practical world. This responsibili of the engineer arises from the breadth of the implications of engineering

whole of society as well as from the depth of the requirements for compe- Technology has radically rearranged human life in our time. There are who believe that, although the threshold of space has been crossed, the of medical and engineering practice has been achieved, and break- have been made in other areas, this impact of engineering on mod- is just a modest preview of the engineering of tomorrow.

neering Education and the Student

dly changing and progressing engineering activity requires an education for ucture based on fundamental principles of science useful in applications ynamic, advanced society. In the fields of engineering and applied science is no substitute for demonstrated ability and competence to solve the ems faced. Without question, achievement in particular courses of study portant. Equally important, however, is the ability to analyze and inter- all the aspects of a problem, to formulate solutions, and to evaluate those ons in the light of all available information. To assure that the under- uate education will enable students to meet these important goals, the fac- of the School of Engineering and Applied Science periodically evaluates praises the undergraduate program.

The curricula of the School of Engineering and Applied Science are founded the basic principle of assisting the student in preparing for a career in engi- ng and applied science. This philosophy requires that the student master principles on which future practice will be based. An education centered ar meaningful junction between theory and practice enables the engineer low the many interests and opportunities that may develop.

should not be assumed, however, that only the intellectual elite should der the study of engineering and applied science. Engineering, like medi- law, education, science, history, government, and other disciplines, re- scholars. But in any of these areas the prospective student who has not ved high scholastic standing can find a place, if the student has genuine est in the subject. The average student who is interested and willing to will find in engineering and applied science a rich and varied field of which can lead to satisfaction and success. It is difficult to make general- ons in this area, but students who have demonstrated an aptitude for ematics, science, and English will probably find the work of engineers and study of engineering and applied science satisfying and challenging. In- intellectual curiosity and the desire to learn and to work hard are good icators of success. College Board examinations may reveal the capacity to ertake further study in mathematics and science and their applications to neering. No school or college can "give" an education. It can offer only pportunity to "get" an education. The George Washington University's of Engineering and Applied Science is a small school which provides pportunity for close contact with faculty members, as well as the oppor- to participate in student organizations, and in many other student ac- es. The School recognizes the individual as the most important element in ucational process.

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE

History

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE was organized Octo
1884, as the Corcoran Scientific School of Columbian University and
situated in the University Building then at 15th and H Streets, N.W.
School was named in honor of William W. Corcoran, Trustee and Pres
of the Corporation from 1869 to 1888. Day and evening courses were o
in literature, science, and technology and led to the degrees of Bachelo
Science, Civil Engineer, Mechanical Engineer, and Mining Engineer
School was among the first to accept women for degree candidacy in
neering.

In 1903 the Corcoran Scientific School, the School of Graduate Studies
the Columbian College were merged into a single Department of Arts
Sciences. Graduate engineering degrees were offered.

Administrative changes led to The Washington College of Engineering
initiated in 1905 as one of the several semi-independent undergraduate co
of the University, each with its own Board of Trustees. The College prov
instruction leading to undergraduate degrees in engineering and architec

In 1909 the name of the College was changed to the College of Engine
and Mechanic Arts, and the curricula were revised to give the student a
ough understanding of the theory underlying engineering practice. Emp
was placed on the development of a knowledge of scientific principles
which the student could build and by which he might solve new problem
they are met in practice.

The name of the School was changed again in 1914 to the College of E
neering and later to the School of Engineering. Architecture was dropped
the curriculum, and degrees were limited to the field of engineering. How
the primary emphasis upon principles rather than technology which ha
acterized the School since 1903 was continued and has remained to this da
one of the important distinguishing features of the School.

In 1962 the name of the School became the School of Engineering and
plied Science.

demic Status

e George Washington University is accredited by its regional accrediting ncy, the Middle States Association of Colleges and Secondary Schools. e University is on the approved list of the American Association of Uni- y Women and is a member of the College Entrance Examination Board. e undergraduate curricula in Civil Engineering, Electrical Engineering, Mechanical Engineering are accredited by the Engineers' Council for Pro- ional Development.

iversity Policy on Equal Opportunity

ccordance with the stated policy of its Board of Trustees and in con- ity with federal laws and regulations, The George Washington Univer- oes not discriminate against any person on the basis of sex, race, color, n, national origin, or handicap in any of its educational programs or ac- es. Federal regulations implementing Title IX of the Educational Amend- ts of 1972 and Section 504 of the Rehabilitation Act of 1973 call for an cit statement that the requirement not to discriminate on the basis of sex ndicap extends to employment in and admission to such programs and ac- ties.

nquiries concerning the application of this policy and federal laws and ulations concerning discrimination in education or employment programs activities may be addressed to Marianne Phelps, Assistant Provost for Af- mative Action, Rice Hall, Washington, D.C. 20052, or to the Director of the ce of Civil Rights of the Department of Health, Education, and Welfare.

Undergraduate Study

E UNDERGRADUATE PROGRAM is intended to provide a solid foundation in the principles, concepts, and techniques underlying engineering and applied ence, on which the individual may build technical competence in a variety areas as his professional career develops. It is preparation for a career in neering or applied science, as it exists today and as it may develop in the ure.

ndergraduate study is the formal beginning of a lifelong continuing pro- ss of education. The School provides an environment that fosters the atti- s and disciplines essential to professional growth. Graduates, when they ive the bachelor's degree, are prepared for productive work in the chosen d and for further development and progress, both formal and informal. undergraduate curricula include courses in the humanities and social sci- s to the extent necessary to develop a reasonable understanding and ap- ciation of these areas of knowledge.

dmission to the engineering program indicates that the student possesses least minimum preparation and the probable capacity to meet the academic ands of this School. Since the School cannot predict either the student's onse to the academic demands or the program to follow for the most ctive development, the undergraduate program has been designed to offer ety of experiences through which the student may find the best path to ional growth and maturity.

The School is a place for learning; for experiencing adventures of the m
and of the hands; for the formulation, exchange, and exploration of ideas. D
ing the undergraduate years the student is led to strengthen skills in anal
and talent for creative activity, through liberal use of project-type lab
tory work. Independent thought and original ideas receive higher evaluat
in the appraisal of student achievements, than the rote recital of informati

To provide the undergraduate engineering student with the opportunity
obtain an enduring foundation in engineering education by combining acade
learning with relevant, real-world employment which provides practical, f
hand experience in engineering, the School of Engineering and Applied Scie
has a Cooperative Education Program in Engineering in which arrangeme
have been made with leading industrial and governmental organizations
student employment at prevailing salary rates. Every effort is made to pl
the student in positions of employment that provide the best possible e
neering experience consistent with career plans. These work periods pro
the student with income that may be used to finance the major portion
tuition and other expenses. Entering freshmen, as well as transfer stude
from community colleges whose completed work is equivalent to requirem
in this program, can be admitted to the Cooperative Education Program
Engineering.

ADMISSION TO UNDERGRADUATE STUDY

The School admits those applicants who can benefit themselves and society
disciplined intellectual effort in its environment. In the selection process, th
is no discrimination because of sex, race, color, religion, national origin,
physical handicap.

Admission is the first selective step in a long series of qualifying steps
student will take in his progress toward professional competence in engine
ing. It indicates the School's belief that the applicant has at least the minimu
preparation and ability to complete the curriculum successfully.

The applicant must be of good character and must have an academic ba
ground appropriate for the program of studies contemplated.

Application for Admission

An applicant for admission obtains from the Office of Admissions of the U
versity or from the School of Engineering and Applied Science an applicati
blank which must be filled out completely and returned with the $10* applic
tion fee.

Students From U.S. Institutions

Records presented become the property of the University and *cannot* be r
turned.

---

* Application fee must be by check or postal money order, payable to George Washington Univer
sity. The application fee is waived for a student applying for readmission who was registered in
a degree program at the time of the student's last registration at this University and who has n
since registered at another institution.

...HMAN ADMISSION

...nsideration for admission is based on the following:

...An acceptable certificate of graduation from an accredited high school ...ing at least 15 units;*

...Scores on these two College Entrance Examination Board tests: the Scho... ...Aptitude Test and the English Composition Achievement Test; or on the ...rican College Test (ACT).

...hen appropriate, the principal's statement that the applicant is prepared to ...ake college work may also be requested.

...The qualifications of applicants who, because of unusual circumstances, do ...meet the above requirements will be considered by the School, which may ...cribe admission tests.

...ne and one-half of the 15 units required for entrance must be distrib... ...as follows: three in English, two in algebra, one in plane geometry, one-... ...n plane trigonometry, one in physics or chemistry, and two in history or ...oreign language. General science may *not* be counted in satisfaction of the ...ence requirement but may be counted as an elective unit.

...is recommended that *both* physics and chemistry be studied in high school. ...gh school course in solid geometry is recommended as a firm foundation ...college mathematics.

...An applicant must arrange to have sent directly *from his school to the Office ...dmissions of the University* the secondary school academic record. This ...rmation may be stated on a form supplied by the University or on a stand... ...orm used by the secondary school, provided that all essential information ...uded.

...*uantitative Deficiency.*—A graduate of an approved high school who lacks ... more than two units of the required subjects and who presents 15 accept... ...units may be admitted to a prescribed program which includes courses to ...e up the deficiencies.

...Applicants who wish to begin study in the fall semester should formulate ...e early in the senior high school year. Although the University prefers to ...e applications submitted during the fall semester of the senior high school ...e applications may be submitted until August 1. Students graduating at mid... ...wishing to begin study in the spring semester *should* apply no later than ...ember 15. Applications and all required credentials of students wishing to ...e study in either the first or second term of the summer session must be ...ved prior to April 15.

...Although decisions on most applications for the fall semester will require sub... ...en of seventh-term grades and senior-year test scores, an earlier decision ...e given after September 1 to a student whose application becomes com... ...with a secondary school record through the junior year and junior-year ...scores, provided these records clearly establish admissibility.

...NSFER STUDENTS

...nsfer students from other institutions (see page 21 for minimum residence ...irement) should submit applications and required credentials prior to Au...

*...represents a year's study in a secondary school subject, including in the aggregate not less ...an forty-minute periods of prepared classroom work.

gust 1 for the fall semester, December 1 for the spring semester, April 1 for summer sessions.

The transfer student must be in good standing as to scholarship and conduct. A student who has been suspended more than one time or academically dismissed will not normally be considered for admission.

An applicant who has attended one or more institutions of higher learning must request *each registrar* to mail directly *to the Office of Admissions of University* a transcript of his or her record, *even if credits were not earned*.

If an applicant has fewer than 30 semester hours of acceptable work (C better in academic courses from an accredited institution), at the time application is submitted, the applicant must request that the high school record and College Examination Board or ACT test scores be sent to Office of Admissions.

If high school units are not shown on the college transcript, the applicant must request that the high school record be sent to the Office of Admissions.

Students from Foreign Institutions

The application, required records, and scores on the *Test of English as a Foreign Language* (see below) must be received from *all international applicants* no later than May 1 for the fall semester, November 15 for the spring semester, and April 15 for the summer sessions.

REQUIRED RECORDS

At the time the application is sent, the applicant must request the educational institution previously attended to send directly to the Office of Admissions copies of official certificates and records listing subjects studied, grades received, examinations taken, and degrees received. Certified copies of diplomas and certificates from all secondary schools, colleges, and universities attended are required. Records of state examinations and certificates are also required. These records become the property of the University and cannot be returned.

These documents should be in the language in which the institution keeps its official records. If they are in a language other than English, the copies which are sent should be accompanied by an English translation.

LANGUAGE TEST

Students whose native tongue is not English should take the TOEFL test (Test of English as a Foreign Language) or the ALIGU test (American Language Institute, Georgetown University). Students are responsible for making arrangements for taking these tests. Foreign students abroad should consult with the nearest U.S. Embassy for information on arrangements for taking ALIGU. Those interested in TOEFL should address inquiries to the following agencies:

1. All European countries (including Cyprus, Great Britain, Iceland, and Ireland): CITO
   Postbus 1034
   Arnhem, The Netherlands
2. All Middle Eastern and North African countries (except Israel):
   American Friends of the Middle East
   Abou Shakra Building

Rue Bliss (Manara)
Beirut, 2500 Lebanon
ng Kong:
Institute of International Education
408 J. Hotung House, Fourth Floor
5/15 Hankow Road, Kowloon, Hong Kong
dia:
Bureau of Educational Research
Ewing Christian College
Allahabad, U.P., 211003, India
epublic of China:
Language Center, 2-1 Hsu-chow Road
Taipei, Taiwan (100), Republic of China

ther applicants should address inquiries to TOEFL, Educational Testing
e, Princeton, New Jersey 08540, U.S.A. The completed application form
st be returned to the appropriate agency well in advance of the beginning
the semester for which the applicant seeks admission. The test fee remitted
the application entitles the student to have the test score sent to three dif-
nstitutions. Registration for the *Test of English as a Foreign Language*
the ALIGU test does not constitute application for admission to George
ington University.
e TOEFL *Bulletin of Information*, obtainable without charge, contains a
ription of the test as well as rules regarding application, fees, reports, and
conduct of the test; lists of examination centers; examination dates; and an
ication blank. On the application for the test, the student should specify
the scores be sent to the appropriate admissions office at this University
"Admission to Undergraduate Study," pages 10–12, or "Graduate Admis-
Procedure," page 22-23).
addition to the TOEFL or ALIGU tests an admitted student may be re-
ed to take a test in English as a Second Language prior to registration. Re-
of this test will determine the courses the student will be permitted to reg-
for in the program of study. If the knowledge of English is inadequate to
the student to undertake any academic work, the student will not be per-
ed to register for any courses other than English and will be required to
English on a full-time basis.
ernational students in the U.S. may take a locally administered George
ington University English placement test in lieu of the ALIGU or TOEFL
Arrangements for this test may be made by contacting:
Dr. George Bozzini, Director
English for International Students
George Washington University
Washington, D.C. 20052
making an appointment. A $10 fee is required for this examination.

NCIAL CERTIFICATE
student plans to enter or remain in the United States to study at this
versity and the visa status will be either student (F) or exchange visitor
a Form I-20 or DSP-66 cannot be issued until the student has been ad-
ed to the University and has completed the Financial Certificate to our
sion.

SPECIAL ENGLISH COURSES FOR INTERNATIONAL STUDENTS

The extensive experience of the Department of English with the language
of international students has been synthesized into a comprehensive E
Language Program that includes the following courses:

ENGLISH AS A FOREIGN LANGUAGE

20 Intensive Basic English (0)

Meets 20 hours per week. The objectives of the course are to stre
the ability to use basic grammatical structures appropriately and to
duce increasingly complex structures; to build reading skills and
large vocabulary through the use of specially adapted materials; to
duce the student to unadapted reading materials, such as newspap
focus on writing sentences; to familiarize the student with the cult
the English-speaking peoples; and to foster multicultural sharing
international students. No academic credit.

30 Intensive Lower-Intermediate English (0)

Meets 20 hours per week. The objectives of the course are to increa
ability to use complex grammatical structures; to develop writing
through the paragraph level and to improve reading skills; to enla
cabulary further and to encourage oral expression through practica
versation and laboratory exercises. No academic credit.

40 Intensive Higher-Intermediate English (0)

Meets 20 hours per week. The objectives of the course are to pro
comprehensive review of grammatical structure, including clauses;
pand vocabulary further through use of unadapted reading materi
increase reading speed and comprehension; to encourage oral expres
ideas encountered in the student's reading material. The course also in
instruction in composition which focuses on outlining and techniq
exposition.

45 Semi-Intensive Higher-Intermediate English

Meets 15 hours per week. The objectives of the course are the same
EFL 40. Students enrolled in EFL 45 may—with the authorization
Admissions office of the school to which they are applying—take on
dergraduate or graduate course concurrently with English.

50 Advanced English

Meets 4 hours per week. An advanced-level composition cours
students showing a high degree of academic proficiency in English
aim of the course is to develop writing skills and to foster an unde
ing of technical writing. The course requires a writing assignment
week and a 10–20-page research paper. For the latter project, the st
is introduced to library research methods. The course meets 4 class h

per week and also involves extensive individual counseling outside the classroom. Students completing this course with a passing grade may enroll in English 11 or 12, the regular second-semester freshman composition courses.

language laboratory is available to all students in the English Language gram. The laboratory contains a library of tapes that accompany the printed and a variety of listening and recording equipment, including individual ing and playback equipment.

mission to a particular English class is determined by a suitable series of ve and nonobjective tests.

English Language Program is administered by the College of General and is offered in cooperation with the Department of English, Professor Keesing, Jr., Chairman. The English for International Students Program is er the direction of Dr. George Bozzini.

sional Registration of International Students

tanding international students whose scores on tests of English compre- indicate the need for further study in English may be admitted to the on a "provisional" basis. After satisfactory completion of English lan- requirements, such students will then be admitted to full admission

mission

udent previously registered in the University who was not registered on s during the immediately preceding semester (summer session excluded) apply for readmission. Final dates for applying are the same as those for graduate admission (see page 11), or graduate admission (see page 22). student applies as a degree candidate and was previously registered as a gree student, or if a student has attended one or more higher institutions absent from the University, the student must have complete, official cripts sent to the appropriate office at this University from each institution ed. Applications for readmission are considered on the basis of regula- currently in effect.

application fee is waived for a student applying for readmission who degree candidate at the time the student last registered at this Univer- and who has not since registered at another institution.

nced Tuition Deposit

notification of acceptance, a $100 advanced tuition deposit will be re- of all full-time undergraduate students including those readmitted. The t is due within 21 days of the date of notification, or not later than for students entering in the fall semester, and December 15 for students in the spring semester. The deposit is credited toward tuition and is ndable.

Advanced Standing

CREDIT BY EXAMINATION

Assuming there is no duplication of course work earned, a maximum
semester hours of credit may be assigned toward partial fulfillment
engineering core curriculum upon admission to the University for each
combination of the following:

College Entrance Examination Board Advanced Placement Tests (AP
Credit is assigned for examinations passed with scores of 4 or 5 on the
a score report sent to the Office of Admissions from the Educational
Service at the student's request. Examinations passed with scores of 3
considered for credit or placement if the student arranges to have the exa
tion paper sent to the Office of Admissions. The Advanced Placement
administered in the secondary school in May of each year. Normally
dents who complete a course designated as Advanced Placement are
for the examination. Arrangements for the examination are the respons
of the applicant and should be made through the secondary school
or with the Program Director, College Entrance Examination Board,
Placement Tests, Box 592, Princeton, N.J. 08540, or Box 1025,
Calif. 94701.

College Entrance Examination Board College-level Examination
(CLEP).—CLEP offers two types of examinations: General and Subject
nations. CLEP General Examinations are offered in five areas: mathe
social sciences, humanities, natural sciences, and English composition.
Subject Examinations measure achievement in specific college-level cours
are offered in more than 20 subjects.

New Students—Upon admission to degree candidacy in the School of
neering and Applied Science, students may be assigned undergraduate
for the General Examinations in the social sciences (six credit hours)
manities (six credit hours) passed at the 50th percentile or above
sophomore norms); such credit is assigned in partial fulfillment of the
it hours required in the humanities and social sciences. Credit is not
against the engineering curriculum for CLEP general examinations
the areas of mathematics, natural sciences or English composition.

Credit is assigned for the Subject Examinations which are applicable
SEAS curricula and which are passed at the level recommended in the
Board model policy.

Registered Students—A candidate for a degree (*i.e.*, a student already
istered at the University before taking the CLEP examinations) must
partmental approval prior to taking the CLEP examination for credit.
may not be earned by passing the examination after having taken the equiv
course or after having taken a waiver examination for the course.

Arrangements for the examinations are the responsibility of the applicant
should be made with the College Entrance Examination Board College-
Examination Program, Box 1824, Princeton, New Jersey 08540.

Department Examinations for Waiver or Credit—Registered SEAS stud
may also take examinations in some departments for waiver of, or credit
a specific course (see Fees, p. 186) upon approval of the appropriate dep
ment chairman; the student must demonstrate sufficient preparation. An exa
nation for credit is not allowed if an examination for waiver has been suc
fully completed or if the student has taken the course.

UP OF CREDIT FOR WAIVED COURSES

mathematics or natural science course required by the engineering cur-
um is waived, the corresponding credit hours must be earned by satisfactory
tion of a university-level course, either technical or non-technical, which
proved by the chairman of the department in which the student is enrolled.

VER OF THE ENGLISH COURSE REQUIREMENT

aiver of the English course requirement in the core curriculum will be grant-
to those who achieve a score of 650 or higher on the English Composition
evement Test of the College Entrance Examination Board.

DIT FROM INSTITUTIONS OF HIGHER LEARNING

re there is no duplication involved either through course work or examina-
advanced standing may be granted for work successfully completed at
edited institutions of higher learning. It will be granted only when it meets
requirements for the degree sought at this University and may be accepted
sionally. Work of low pass grade (*D* or the equivalent) will not be con-
ed for transfer.
Although there is no strict limit to the total amount of transfer credit that
be assigned, a student must satisfy the residence and course requirements
the degree sought at George Washington University.

DIT FROM TECHNICAL INSTITUTES

nced standing may be granted for work successfully completed at techni-
institutes. Credit will be granted for transferred work only when the appli-
passes successfully the required validation examination. Arrangement for
examination should be made with the appropriate department of the School.
any event, no more than 30 semester hours of credit for technical work will
granted in transfer for those who graduated from a two-year technical insti-
. A maximum of 60 semester hours of credit for technical work may be
ted in transfer for those who graduated from a four-year technical institute.

DIT FROM SERVICE SCHOOLS

limited amount of credit may be assigned for selected service school instruc-
received since 1941. No more than 30 semester hours may be assigned for
mbination of service schools and examinations referred to above. Veterans
ld submit to the Office of Admissions photostatic copies of their service
ol records, indicating courses successfully completed with sufficient identifi-
on of the course to locate it in the *Guide to Evaluation of Educational Ex-
ence in the Armed Forces.*

DIT FROM BALTIMORE POLYTECHNIC INSTITUTE

dit will be assigned to Baltimore Polytechnic Institute "A" course gradu-
who have earned scores of 80 or above in the applicable courses equiva-
to the following engineering core curriculum courses: Math 31, 32; Phys
Chem 13; Engs 4; EE 51.

CREDIT EARNED THROUGH UNITED STATES ARMED FORCES INSTITUTE (USAFI)

Credit is assigned for approved United States Armed Forces Institute col level examinations passed with satisfactory scores.

REGULATIONS

Regulations regarding REGISTRATION, FEES, AND FINANCES *are stated on p 183–89; other University regulations, on pages 193–98.*

Attendance

Students may not attend classes until registration is completed and fees due paid or appropriate arrangements are made with the Office of Student counts. Students may attend only those classes for which they are registe Regular attendance is required. Students may be dropped from any course undue absence.

Students are expected to attend every meeting of the courses in which are registered, fully prepared to carry on the work required. Students are responsible for all work in their courses, and all absences must be excused fore provision will be made for them to make up the work missed. Excuses absences from examinations which have been announced in advance can obtained only by written application to the instructor in charge of the cou

Academic Work Load

A full-time undergraduate student who is not on probation may register for more than 20 semester hours. A student employed more than 24 hours a w who is not on probation may take no more than 10 semester hours. In exc tional cases these limits may be exceeded with the Dean's permission.

Advisory System

The School of Engineering and Applied Science encourages a close facul student relationship. Every entering undergraduate student is assigned a perm nent faculty adviser to assist in orientation in the professional discipline. F ulty advisers counsel students on their programs of study, the achievement a maintenance of satisfactory scholastic performances, professional developme and extracurricular activity as part of the educational process. The advi represents the student in all cases requiring faculty action.

Students must obtain their advisers' approval of programs of study prior registration for each academic semester and summer session. Until the wo required for the degree is completed, the student must consult the adviser all academic matters. However, an adviser may not deny entry into any cou or activity to which the student is entitled under the regulations of the Scho

All students are encouraged to discuss college problems with their advisers instructors at any time, and parents or guardians are invited to consult wi the Dean, Associate Dean, department chairman, and advisers concerning a student problems.

Faculty advisers counsel students to the best of the advisers' professiona knowledge, but the final reponsibility for a student's action lies with the studen

Scholarship

For scholarship requirements for graduation, see "Graduation Requirements," pages 20–21.

Grades.—Grades are mailed to the student through the Office of the Registrar at the close of each semester. They are not given out by instructors.

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfactory; *D*, Low Pass; *F*, Fail. Whenever a grade has not been assigned, the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) or the symbol *F* (Failure due to Unauthorized Withdrawal) will be recorded. The symbol *I* indicates that a satisfactory explanation has been given the instructor for the student's inability to complete the required work of the course.

At the option of the instructor, the grade of *I* may be recorded if a student, for reasons beyond his control, is unable to complete the work of the course, and the instructor is informed of, and approves, such reasons before the date when grades must be reported. The grade may be used only if the student's prior performance and class attendance in the course have been satisfactory. Any failure to complete the work of a course which is not satisfactorily explained to the instructor before the date when grades must be turned in will be graded *F*. If acceptable reasons are later presented to the instructor, that instructor may initiate the appropriate grade change. Although the grade of *I may* remain on the record for a maximum of one year, the instructor should normally set a much shorter period within which the uncompleted work (usually the final examination or required paper) must be made up. The grade of *I* cannot be removed by the student's reregistering for the course here or taking its equivalent elsewhere. An *I* cannot be made up after the lapse of one calendar year.

Quality-point Index.—Scholarship is stated in terms of the quality-point index. The index is obtained by dividing the student's total number of quality points by the total number of semester hours for which the student registered. Quality points are computed from grades as follows: Each grade is assigned a numerical equivalent—*A*, four points; *B*, three points; *C*, two points; *D*, one point; *F*, no points. The quality points for a course are obtained by multiplying the credit hours of the course by the numerical equivalent of the grade received. Courses marked *W* or *I* are not considered in determining the index. Courses marked *I* will be included once the *I* is converted to a regular letter grade. Grades in courses taken at other institutions are not considered in computing the quality-point index, with the exception of courses taken at one of the Consortium universities (see pages 183–84 and 199).

Mid-semester Warning.—At the end of the seventh week of each semester, instructors report to the Dean the names of students whose scholarship is unsatisfactory. On receipt of a warning notice the student must consult the instructor and adviser immediately. The adviser may prescribe diagnostic tests and/or remedial study to be completed before the end of the current semester.

Probation.—A full-time student (one taking 12 semester hours or more) whose quality-point index based on all courses attempted in his most recent semester falls below 2.00 for that semester, or who receives two grades or more of *F* in one semester, will be placed on probation. A student enrolled for less than 12 semester hours during the fall or spring semester and a student enrolled during the summer sessions is subject to probation or suspension on the basis of the student's record for the most recent 12 semester hours, rather than on

the record in any one semester. The probation period is for one semester full-time students, or the next 12 semester hours of study for part-time stude

To be removed from probational status, a student must earn a quality-p index of at least 2.00 in all courses taken during the period of probation receive no grade of *F* during this period.

A student who fails to achieve a quality-point index of 2.00 for all co completed during the probation period is continued on probation for an a tional period of one semester or 12 semester hours of study.

Upon being placed on probation, a student may be required to undertak Engineering Student Probation Program of testing, counseling, and reme work available at the Counseling Center. A student on probation is requi to follow a program of study prescribed by the adviser and department ch man, and is cautioned not to take more than 12 semester hours of study. student is not eligible to participate in student activities.

Suspension.—The following cases constitute grounds for suspension: two or more grades of *F* received during a probation period; (2) failure achieve a quality-point index of 2.00 in a second consecutive period of bation; (3) failure of a student who has been on probation for three period achieve a quality-point index of 2.00 in the third period or any subseq semester.

DEAN'S HONORS LIST

The Faculty of the School recognizes meritorious scholastic achievement Dean's Honors List, containing the names of candidates for undergraduate grees whose scholastic achievement satisfies all of the following requirem

1. The student must have completed a minimum of 13 semester hours in semester with a quality-point index of 3.00 or higher and with no more one grade of *C*.
2. No grade below *C* may have been received during the qualifying pe
3. No disciplinary action may have been taken with respect to the stud

The Dean's Honors List is prepared at the end of the fall and spring sem ters and displayed in an appropriate public place in the School. A notatio made on the student's record each time his name is included in the List.

Use of Correct English

Any student whose written or spoken English in any course is unsatisfac may be reported by the instructor to the Associate Dean. The Associate D may assign supplementary work, without academic credit, varying in amo with the needs of the student. If the work prescribed is equivalent to a cou the regular tuition fee is charged. The granting of a degree may be delayed failure to make up any such deficiency in English to the satisfaction of Associate Dean.

Graduation Requirements

See page 196 for general requirements for graduation.

ENCE

nimum of 30 semester hours must be completed in residence. Summer may be counted. Unless special permission is granted by the Dean to elsewhere, the work of the final year must be completed in residence.

ARSHIP

o eligible for graduation a student must have (a) a quality-point index of at 2.00 in those technical courses specified in the fifth through the eighth ter of the curriculum, and (b) a 2.00 overall average.

ORS

Distinction.—A bachelor's degree may be conferred "With Distinc- the discretion of the Faculty, if a student attains a quality-point index 0 or higher on all work taken at this institution. To be eligible for this a student must have completed at this institution at least one-half of the required for the degree and must petition the department chairman no the beginning of the student's final semester.

Honors.—A bachelor's degree may be conferred with "Special Hon- the discretion of the Faculty, for outstanding achievement in the stu- enior year work on recommendation of the Faculty, under the following tions:

The student must have candidacy for Special Honors approved by the de- ent chairman representing the major field not later than the beginning of enior year.

The student must meet such other conditions as may be set at the time acy is approved.

No student will be awarded Special Honors unless a quality-point index least 3.00 is achieved on all work taken at this institution.

To be eligible for Special Honors a student must have completed at this ion at least one-half of the work required for the degree.

UNDERGRADUATE CURRICULA

our-year undergraduate curricula lead to the degree of Bachelor of Science, arenthetic designation of the major; for example, Bachelor of Science ical Engineering). Students who are deficient in preparation require a period; those who are admitted with advanced standing or who attend er sessions can complete the requirements in less time.

program of the first four semesters (2 years), with minor exceptions, is n to all curricula and provides the essential broad base of scientific prin- and mathematical techniques necessary for the professional courses of r four semesters, together with an appropriate background in the ties and social sciences (see below).

inimum total of 130 semester hours is required to qualify for the de- certain options may require more than the minimum. However, stu- encouraged to elect additional course work above the required mini- the extent that their interests and the School's offerings permit.

Degrees are offered in Civil Engineering, Electrical Engineering, and
chanical Engineering. Students in Civil Engineering may select options in
puter-oriented, Environmental-oriented, and Geotechnical Civil Engine
students in Mechanical Engineering may select options in Computer-or
Mechanical Engineering and in Energy Resources and Power-oriented
chanical Engineering. Electrical Engineering provides options in Com
Science and Premedical Engineering.

The student is assisted by a faculty adviser, who approves the program
semester prior to registration. For the guidance of the student and the sc
every beginning freshman takes the placement examinations in English
mathematics. A student who is deficient in mathematics may be requir
take remedial work. Results on the English placement test determine the
of the English course the student will take.

Courses in the Humanities and Social Sciences

The program in the humanities and social sciences for engineering st
assists them in acquiring knowledge which will permit an understanding
social and humanistic elements of the past and present and an analysis of
lems facing society today. The ultimate goal is to help the engineer have
ter understanding of society and an appreciation of the engineer's role a
sponsibilities within it.

Since the education of an engineering student is, by necessity, orient
ward technical subjects, the program in the humanities and social sc
should not emphasize technical aspects and skills, but should rather cons
courses which broaden the outlook. As a consequence, courses in su
such as accounting, finance, industrial management, introductory language
personnel administration should not be included in the humanities and
sciences program. On the other hand, courses in areas such as anthrop
economics, fine arts, geography, history, literature, philosophy, politica
ence, psychology, and sociology are considered appropriate.

Each engineering student is required to prepare, with the assistance
faculty adviser, a program of courses in the humanities and social sci
explaining how the program meets the purpose stated above. The stu
program must include a minimum of 18 semester hours and must be app
by both the adviser and department chairman.

Graduate Study

THE SCHOOL OF ENGINEERING AND APPLIED SCIENCE offers graduate study
ing to the degrees of Master of Science, Master of Engineering Administra
and Doctor of Science, and to the Professional degrees of Engineer and Ap
Scientist.

In its graduate programs, the School, as it does in undergraduate s
adheres to the educational philosophy of increasing the knowledge and u
standing of the individual student by concentration on principles and
application rather than by encyclopedic coverage of techniques and specia

Each program is individually planned according to the student's prepa- and needs.

duate study may be undertaken in any field of engineering or applied in which the School has adequate facilities and resources. Upon ap- the student may select courses in other departments of instruction in versity to serve specific needs or objectives. A complete list of available and areas of concentration is included under each departmental listing in Programs of Study and Courses of Instruction" section of this catalogue ing on page 47.

THE MASTER'S PROGRAMS

student's program may provide for broad coverage in a variety of fields may be designed to provide a concentration in particular areas. The mini- program consists of 24 semester hours of approved graduate courses and ster's thesis (equivalent to 6 semester hours). With the approval of the rtment the student may elect an optional program without a thesis which ses of a minimum of 33 semester hours of approved graduate courses. All er's candidates are required to pass a Master's Comprehensive Examina- Students whose undergraduate study does not include necessary prerequi- may be required to take more than the minimum semester hours required. pon admission the student is assigned an adviser. Programs of study are rmined by any prerequisites established and by the requirements of the de- ent in which the student wishes to study. The program of studies in ration for the Master's Comprehensive Examination must be approved by student's adviser and the appropriate department chairman.

ission

ssion to graduate study toward a Master's degree requires an appropriate lor's degree from a recognized institution and evidence of capacity for ctive work in the field selected, such as may be indicated by undergraduate es, Graduate Record Examination scores, and similar data.

applicant who has significant deficiencies in preparation may be required ete prescribed undergraduate courses as an unclassified student before s admitted to graduate student status. In some cases, if such deficiencies minimal, he may be admitted to graduate student status and allowed to limited number of graduate courses while completing the undergraduate ses in which he is deficient. In no case may the undergraduate courses taken fulfill any part of the requirements for the Master's degree.

or additional admissions requirements for the degrees of Master of Engi- ng Administration and Master of Science in the Department of Engineer- Administration, see pages 152 and 157; for the degree of Master of Science e Department of Operations Research, see page 170. Candidates for the de- of Master of Science in the Department of Electrical Engineering and puter Science must have satisfied specific undergraduate requirements, ending upon the area of concentration.

SSION PROCEDURE

ms for application for admission are available at the School of Engineering

and Applied Science. They must be submitted, together with the nonrefun application fee of $25, to the Manager of Engineering Admissions, Room Tompkins Hall of Engineering, George Washington University, Washin D.C. 20052, no later than August 1 for the fall semester, December 1 the spring semester, May 1 for the first summer session, June 1 for the se summer session, and July 1 for the third summer session. The applicant request each educational institution attended since high school graduati send an official transcript of the student's record directly to the Manag Engineering Admissions. Although not required, the applicant who has pleted the Graduate Record Examination should request that the score sent to the School. The applicant will be notified by mail when a decisio admission has been made. English language and other pertinent require for international students are contained on pages 12–15.

All inquiries and correspondence relative to graduate admission shou directed to the Manager of Engineering Admissions.

TRANSFER CREDIT

Up to 6 semester hours of satisfactory credit (with grades of *A* or *B*), normally must have been earned in a graduate program at another recog institution, *may* be accepted in transfer, when applicable, to satisfy M degree requirements in this School. However, the student must, with th proval of the adviser, petition to the appropriate department chairman for a transfer.

Registration

A graduate student may register for classes upon presentation of an o letter of admission or a Student Identification Card from the previous sem No registration is accepted for less than a semester or one summer session

Concurrent registration in this School and in another institution not a ber of the Consortium of Universities of the Washington Metropolitan Inc., or another division of this University requires the written permissi the Deans concerned, *prior to registration*. Allowance of credit for work concurrently at another institution is at the discretion of the Dean.

Dates and hours of registration are stated in the Calendar, page 4, o the *Schedule of Classes* published in advance of each semester.

Master's Thesis

In those programs requiring a thesis, the degree candidate must submit a ceptable thesis to demonstrate the ability to make independent use of the kn edge and discipline of thought acquired and developed by graduate study furnish objective evidence of constructive power in a given field, and to d onstrate the ability to communicate the results of the work in writing. Wor a suitable character for which the student has professional responsibility be considered, whether done on or off campus, provided no significant amo of work is completed without faculty supervision.

As a part of registration for the thesis course 299, the candidate must s the thesis area to the appropriate department chairman, on the form tained from the School office and approved by the faculty adviser. The

must submit the thesis title to the Dean, on the form available in the office, at the beginning of the semester of expected graduation. Registration thesis 299–300 entitles the student, during such registration, to the of the member of the faculty under whom the thesis is to be written. student may consult the adviser, but the student has primary responsibility thesis.

thesis in final form must be submitted to the appropriate department man by the date stated in the calendar for the semester in which the can- enrolls in thesis 300. In case a thesis is unfinished on the date specified, dent will be granted an additional semester and must pay the "Continu- registration" fee (see page 185) unless he is registered for course work. If paration of the thesis extends beyond the three semesters, approval for tension of time will be required and the student must reregister for thesis pay tuition as for a repeated course. The overall time limit for earn- degree (see page 25) may not be exceeded.

hesis may be submitted in final form one time. The acceptability of the s determined exclusively by the Master's Comprehensive Examination ittee. If the thesis is unacceptable, the student's graduate status is ter- ed.

ied copies of detailed regulations regarding the form and reproduction of hesis are available in the Office of the School. Accepted theses, with ac- ng drawings, become the property of the University and are deposited University Library, where the duplicate copies are bound and made e for circulation.

al Master's Program without a Thesis

ve approval of the department, a student may elect an optional program ut a thesis which consists of a minimum of 33 semester hours of approved ate courses.

r's Comprehensive Examination

dent must pass a Master's Comprehensive Examination to demonstrate ntial understanding of principles and methods and their use in the area of . This Examination may be written, oral, or both. A graduate stu- who fails any portion of the Master's Comprehensive Examination on the mpt may be examined one more time if approval is given by the appro- Examining Committee. In the event of failure to complete the Exami- satisfactorily, the student's graduate status terminates.

tions

ions regarding REGISTRATION, FEES, AND FINANCES *are stated on pages ; other University regulations, on pages 193–98.*

DANCE

may not attend classes until registration is completed and fees due are appropriate arrangements are made with the Office of Student Accounts. attend only those classes for which they are registered. Students ted to attend every meeting of the course in which they are registered,

fully prepared to carry on the work required. Students may be dropped any course for undue absence.

SCHOLARSHIP

Grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fa *CR*, Credit for satisfactory thesis completion. Whenever a grade is not as the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal corded.

Students who receive two grades of *F*, or three grades below *B*, are from further enrollment in graduate courses and, ordinarily, will not admitted to graduate study.

Pass-Fail Grading System.—All SEAS students who have a keen de advance their knowledge may take SEAS courses under the pass-fail system on the basis that the courses cannot be used toward any degre gram at SEAS.

At the option of the instructor, the grade of *I* may be recorded if a st for reasons beyond the student's control, is unable to complete the work course, and if the instructor is informed of, and approves, such reasons the date when grades must be reported. The grade may be used only if t dent's prior performance and class attendance in the course have been factory. Any failure to complete the work of a course which is not sa torily explained to the instructor before the date when grades must be in will be graded *F*. If acceptable reasons are later presented, the tor may initiate an appropriate grade change. Although the grade *may* remain on the records for a maximum of one year, the instructor normally set a much briefer period within which the uncompleted work be made up. The grade of *I* cannot be removed by the student's reregi for the course here or taking its equivalent elsewhere. An incomplete wh not removed within one calendar year is automatically changed to an *F*.

A student may not repeat for credit a course in which the student has re a grade of *C* or above, unless required to do so by the department conc A written statement requiring the student to repeat such a course for must be submitted to the Registrar by the appropriate department cha

GRADUATION REQUIREMENTS

Non-thesis Option.—A student may graduate with either:

1. 33 course credit hours of *B* or better with no more than two grades *B* of which only one *F* is permitted; or

2. A 3.00 quality-point index with a minimum of 33 course credit with no more than two grades below *B* of which only one *F* is permitted.

Thesis Option.—In addition to 6 credit hours of acceptable thesis, a st may graduate with either:

1. 24 course credit hours of *B* or better with no more than two grades *B* of which only one *F* is permitted; or

2. A 3.00 quality-point index with a minimum of 24 course credit with no more than two grades below *B* of which only one *F* is permitted.

Quality-point Index.—Scholastic standing is computed in terms of the q point index obtained by dividing the number of quality points by the numbe

...r hours for which the student registered.
...ity points are computed from grades as follows: *A*, four points; *B*, ...ints; *C*, two points; *F*, no points, for each semester hour for which the ... registered. Courses marked *W* or *I* are not considered in determining ..., except that courses marked *I* will be considered when a formal grade ...rded. Grades in courses taken at other institutions are not considered in ...ing the quality-point index, with the exception of courses taken at one of ...sortium universities.

...ENCE AND CONTINUOUS STUDY

...rk for the degree must be done in residence (on the campus) except ...pecial permission is granted by the chairman of the department. The ... must maintain continuous registration in the School. Failure to do so ...ne student's registration, and the student must apply for readmission to ...ster's degree program under whatever conditions and regulations are in ... that time.

... TO COMPLETE MASTER'S DEGREE REQUIREMENTS

...-time student in the Master's program is allowed a maximum of three ...er years to complete all degree requirements, from the date of the student's ...duate-student status registration in prerequisite or graduate courses. A ...me student in the Master's program is allowed a maximum of five cal- ...ified student before admission to graduate student status, nor does it ...pass any specified period spent on approved leave of absence. Read- ... is required upon expiration of leave of absence under the conditions ...irements then prevailing.
...dents who do not complete degree requirements within the allowed time ...their graduate status terminated. They may be readmitted to graduate ...nder conditions specified by the department chairman and approved by ...ean.

PROFESSIONAL DEGREE PROGRAM

...School of Engineering and Applied Science has established the Professional ...e program to provide an educational program for those students who are ...ested in pursuing course work beyond the Master's degree, with emphasis ...ced subject material rather than on basic research.
...ssful completion of the Professional degree program leads to the degree ...neer or degree of Applied Scientist.
...e Professional degree program, the School adheres to the educational ...any of increasing the knowledge and understanding of the individual by ...sis on principles and their application. This approach should provide ...dents with a technical flexibility to enable them to adapt successfully to ...changing technology. Each program is individually planned according ...student's background and needs and is subject to departmental require-

... Professional degree program has been designed to satisfy the needs of

industry and government for highly trained and educated technical perso
engineering and applied science.

Professional Degree Study Programs

The Professional degree program provides graduate study in those fi
engineering or applied science in which the School has adequate facili
resources. Upon approval, the student may select courses in other depar
of instruction in the University to serve specific needs or objectives.

The student's program may provide for broad coverage in a variety o
or may be designed to provide a concentration in particular areas. The
mum program consists of 30 semester hours of approved graduate cour
yond a Master's degree. Students whose graduate study does not include
sary prerequisites may be required to take more than the minimum se
hours required.

Admission

Admission to graduate study toward the Professional degree requires an
priate Master's degree from a recognized institution and evidence of capac
productive work in the field selected as indicated by prior scholarshi
where appropriate, professional experience.

REQUIREMENTS

1. *Engineer.*—To study toward the degree of Engineer, an applicant
possess a Master's degree and a bachelor's degree in the area of engine

2. *Applied Scientist.*—To study toward the degree of Applied Scienti
applicant must possess a bachelor's degree in either engineering, mathem
or natural science; and a Master's degree in either engineering, natural sc
mathematics, or administration. Applicants having an equivalent quanti
background may be considered as special cases by the respective depart

Normally, a *B* average in graduate work is required. However, the mi
does not assure automatic acceptance; the departments may, and often d
higher admission standards.

ADMISSION PROCEDURE

Forms for application for admission are available at the School of Engine
and Applied Science. They must be submitted, together with the nonretur
application fee of $25, to the Manager of Engineering Admissions, Room
Tompkins Hall of Engineering, George Washington University, Washi
D.C. 20052, no later than August 15 for the fall semester, December 15 fo
spring semester, May 1 for the first summer session, June 1 for the se
summer session, and July 1 for the third summer session. The applicant
request each educational institution attended since high school graduate
send an official transcript of the student's record directly to the Manage
Engineering Admissions. The applicant will be notified by mail when a
cision on admission has been made. English language and other pertinen
quirements for international students are on pages 12–15.

All inquiries and correspondence relative to graduate admission shou
directed to the Manager of Engineering Admissions.

SFER CREDIT

6 semester hours of satisfactory credit (with grades of *A* or *B*) beyond a
's program, which must have been earned in the five years preceding the
of study toward the Professional degree, may be accepted in transfer when
ible to satisfy Professional degree requirements in this School. However,
tudent must, with the approval of the adviser, petition to the appropri-
epartment chairman for such a transfer.

ram of Study

admission the student is assigned an adviser. Programs are determined by
ished prerequisites and the requirements of the department in which the
nt wishes to study. The program of studies for each candidate for the
ional degree must be approved by the student's adviser and the appro-
department chairman.
applicant who has significant deficiencies in preparation may be required
e prescribed undergraduate and graduate courses before being admitted to
ional degree candidate status. In no case may these courses thus taken
any part of the requirements for the Professional degree.
individual department may require the degree candidate to undertake
efend the results of a technical design project, development problem, or
eparation of a comprehensive technical report to demonstrate the candi-
ability to make independent use of the knowledge and discipline of
t acquired and developed by graduate study. When applicable, the stu-
will be informed of this requirement by the faculty adviser at the time the
's program is being formulated.
no case, however, will this project be more than 6 credit hours out of a
mum of 30 credit hours.

olarship

student studying for the Professional degree may receive more than two
grades below *B*. If more than two course grades below *B* are received,
is terminated and further enrollment is prohibited. A student must achieve
quality-point average of 3.00 to receive the degree.

e to Complete Professional Degree Requirements

ull-time student in the Professional degree program is allowed a maximum
ee calendar years to complete all degree requirements, from the date of the
graduate student status registration in prerequisite or graduate courses. A
me student in this program is allowed a maximum of five calendar years.
time limit does not include any period of registration as an unclassified
nt before admission to graduate student status, nor does it encompass any
ed period spent on approved leave of absence. Upon expiration of leave
ence, readmission is required under the conditions and requirements in
at the time of the student's readmission.
ents who do not complete degree requirements within the allowed time
their graduate status terminated. They may be readmitted to graduate
under conditions specified by the department chairman.

Interrelationship with the Doctoral Program

Candidates for the D.Sc. degree or Professional degree who are in good
demic standing may, with the approval of the faculty adviser and depart
chairman, transfer from one degree program to the other, if they meet nece
qualifications and requirements as specified by the appropriate department

Residence and Continuous Study

All work for the degree must be done in residence (on the campus) e
when special permission is granted by the chairman of the department.
student must maintain continuous registration in the School. Failure to
breaks the student's registration, and the student must apply for readmiss
the Professional degree program under whatever conditions and regulatio
in effect at that time.

THE DOCTORAL PROGRAM

The School of Engineering and Applied Science offers a program of adv
study and research leading to the degree of Doctor of Science. This pro
is limited to those fields in engineering or applied science in which a disc
has been established and for which the University has or can arrange ade
resources.

The doctoral program is designed to prepare the student for a career of
tive scholarship by providing a broad but balanced background of know
and guidance in the performance of research. It requires study of interre
fields of learning as well as original research in the field of central interest

The program for the degree is divided into two stages. The first—mai
of a study of interrelated fields of learning which supports the general ar
research concentration—culminates in the qualifying examination. The se
—composed of research investigation of a particular subject in a special
and the presentation of such research findings in a written dissertation—
nates in the final examination.

Admission to Doctoral Study

A satisfactory Master's degree from an accredited institution is required
gether with acceptable personal qualities and a capacity for creative sch
ship. Normally, a *B* average in graduate work is required. However, the
mum does not assure automatic acceptance; the departments may, and ofte
set higher admission standards.

APPLICATION FOR ADMISSION

Forms for application for admission are available at the School of Enginee
and Applied Science. They must be submitted, together with a nonrefund
application fee of $25, to the Manager of Engineering Admissions, Room
Tompkins Hall of Engineering, George Washington University, Washing
D.C. 20052. The prospective doctoral student seeking admission should
before June 1 for the fall semester and before December 1 for the sp
semester. Personal interviews may then be arranged to discuss the applica
qualifications and the possibilities for an effective doctoral program. The

must arrange for complete documentary records (transcripts) to be forded to the Manager of Engineering Admissions in sufficient time to permit ...y of complete records for evaluation as soon after the above application ...es as possible.

...e applicant must arrange for letters of recommendation to be submitted ...wo faculty members of the institution from which the student received ...Master's degree; one of these, if possible, should be from the Master's ad... The letters should be addressed to the appropriate department chairman. ...glish language and other pertinent requirements for international students ...ven on pages 12–15.

...age Requirement

...octoral student should maintain a broad outlook as he pursues his study, ...herefore must have the capability of reading appropriate literature pub... in a foreign language. Accordingly, a reading knowledge of one foreign ...age, preferably Russian, must be demonstrated before admission to the ...ving examination. If the student wishes to satisfy this requirement with a ...age other than Russian, he must obtain the approval first of his doctoral ...er, then of his department chairman; permission to use a language other ... Russian will be granted on the basis of its importance to the student's ...of interest.

... Requirement

...dition to the language requirement, an examination in a tool requirement ... computer programming) may be established by the various departments.

... for the Qualifying Examination

...e admission to the first stage of the program, *i.e.*, study of interrelated ... culminating in the qualifying examination, the student is assigned a fac... adviser who directs his studies.* The adviser approves appropriate fields ...dy to insure the student's breadth of knowledge and to support research ...e central field of interest, gives advice concerning the scope and content of ...s of study, and guides preparation for the qualifying examination. Pro... of study are normally structured to include a major field of study and ... minor or supporting fields.

...minimum of 30 semester hours of credit in a formal program at the grad... level beyond Master's study is required. In many cases, particularly when ...dent undertakes a doctoral program in a field other than that in which ...dent obtained the Master's degree, the program of studies exceeds 30 ...ster hours.

...dents admitted to doctoral study are encouraged to undertake one year of ...time study on campus. In general, the adviser will require the student to ...ter for a minimum of 6 semester hours of course work in every semester ...or the summer sessions.

...ster of Credit

...to 6 semester hours of credit earned in courses completed with the grade

* ... departments, instead of a faculty adviser, a faculty committee may be appointed to ... programs, direct study, and carry out all other responsibilities of the faculty adviser.

of *A* or *B* while enrolled in a doctoral program at another accredited in tion may be accepted in transfer to satisfy doctoral requirements of this Sc subject to the approval of the student's adviser and the department chai Credit earned in courses completed more than five years prior to admiss the doctoral program will not be accepted in transfer, and some depart may require that transfer credit must have been earned within a shorter p of time before admission.

The Qualifying Examination*

The purpose of the qualifying examination is to ascertain that the stu background and intellectual development are adequate to support doctor search in the central field. Qualifying examinations may be written or o both, and are scheduled over a period of several days. They are conducte during the fall and spring semesters on dates established by the depart and are administered by a faculty committee. Upon favorable report examiners to the Dean through the appropriate department chairman, th dent is admitted to candidacy for the degree; the student then begins speci study and research under the supervision of a designated member of th ulty or, in special instances, an outstanding engineer/scientist who is member of the faculty.

The qualifying examination is the principal means used to determi student's ability to qualify as a candidate for the doctoral degree and to the second stage of the program.

At the discretion of the committee which prepared the examination, th toral student may be given a second opportunity to qualify for candidacy event of failure in any part of the qualifying examination. In general, the qualifying examination must be retaken by the student in order to quali candidacy.

Scholarship

To be admitted to the qualifying examination, the doctoral student must a an overall academic average of 3.20 on a scale of 4 (a grade of *A* eq points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student m ceive more than two course grades below *B*. If the student does receive than two course grades below *B*, the graduate study is terminated and f enrollment is prohibited. Courses in which the student earns grades be are not included in the total semester-hour requirement for the degree. dent who receives any grade below *B* is required to consult with the advis a review of the student's program of study and discussion of possible ch therein.

Research, Dissertation, Final Examination

The student admitted to candidacy for the degree of Doctor of Science req as Director of Research the member of the faculty under whom the st wishes to conduct research. The faculty member may accept or reject suc quest. The research area is approved by the Director. Throughout the re

* Some departments may administer a pre-qualifying examination prior to completion of th program.

the doctoral program the candidate conducts dissertation research directly
the Director. However, the student is not precluded from consulting with
members of the faculty, as may be required, on an informal basis, and
be encouraged to do so by the Director of Research. A committee of the
consisting of three members including the Director as chairman will
in the final preparation of the dissertation. The department chairman
ts such a committee on the recommendation of the Director of Research.
ve the dissertation is equivalent to a minimum of 24 semester hours.

DISSERTATION

sertation is required as evidence of ability to perform original scholarly
rch and to present and interpret the results. The student is solely respon-
for the content of the dissertation.
e aim of the student in this stage of candidacy is the production of a
tation which embodies the results of an extended original study and which
es material deemed worthy of publication in recognized scientific and en-
ng journals. The student is expected to attempt to publish the results of
search as soon as possible after the student receives the degree and to
copies of the published material to the Dean. Credit must be given in
blication to the fact that the material is abstracted, summarized, devel-
etc., from a dissertation submitted to George Washington University in
fulfillment of the requirements for the Doctor of Science degree.
e candidate must submit to the appropriate department five complete cop-
the dissertation and an abstract (not to exceed 600 words) of the disser-
no later than the date specified in the calendar. The abstract is included
announcement of the examination and is reproduced by University Mi-
ms, Inc. One copy of the dissertation is also sent to University Microfilms,

ted copies of detailed regulations regarding the form and reproduction
dissertation, preparation of the abstract, and services offered by Univer-
Microfilms, Inc., are available at the School office. The successful candi-
for the doctorate is required, before receiving the degree, to pay a fee to
part of the expense of printing the abstract of the dissertation, and for
ic service rendered by University Microfilms, Inc. Accepted disserta-
with accompanying drawings, become the property of the University and
posited in the University Library, where bound copies are available for
ction.

FINAL EXAMINATION

acceptance of the dissertation by the committee, consisting of the Direc-
and two other faculty members of this School, which has assisted in super-
its final preparation, the candidate is presented for the final examination.
final examination is oral and is open to the public. The candidate must
nstrate a mastery of the special fields of study and of the materials and
ques used in the research. The committee of examiners will consist of not
than five members, three of whom must be members of the faculty on full-
service. The committee may include qualified experts brought to the Uni-
especially to participate in the examination. The Director of Research

serves as Advocate for the candidate. When the candidate satisfies the ex
ing committee of the high quality and originality of the candidate's contrib
to knowledge as well as the mastery of the scholarship and research techn
of the field, the committee of examiners recommends the candidate for t
gree of Doctor of Science. The final examination is conducted only durin
fall and spring semesters. The candidate should consult with the appro
department chairman as to possible dates for the examination.

Residence and Continuous Study

All the work for the degree must be done in residence (on the campus
cept when special permission is granted by the chairman of the depart
The student must maintain continuous registration in the School. Failure
so breaks the registration, and the student must apply for readmission t
toral study under whatever conditions and regulations are in effect at that
In case of incapacity or other legitimate reasons, the student may be gra
leave of absence of up to one year. Extension of such leave will requir
cial request to and approval of the appropriate department chairman. D
approved leave of absence, the student must maintain continuous re
tion. The time period for completion of all requirements for the degree w
adjusted on the basis of the approved leave of absence.

In general, one year of study is the minimum amount of time to be sp
preparation for the qualifying examination. The qualifying examination
be completed within five years of the date of admission, and the entire
program must be completed within seven years. After admission the st
may apply for the qualifying examination whenever the student feels pr
prepared. A minimum of two years of full-time study and research shou
expected in meeting the requirements for the degree.

Special Programs

INSTITUTE FOR THE STUDY OF FATIGUE, FRACTURE, AND STRUCTURAL RELIABILITY

The basic objective of the Institute for the Study of Fatigue, Fracture
Structural Reliability of the School of Engineering and Applied Science
develop an interdisciplinary approach to fatigue research through close coo
tion of research workers from different fields. The Institute deals princi
with the study of the physical mechanism of damage initiation, in ord
establish principles for the rational design of metal alloys of superior fa
performance on the one hand, and to develop advanced methods of fa
design and reliability on the other. Because of the large volume, past and
rent, of straight fatigue testing of standard test specimens in industrial, go
ment, and university laboratories, no testing of this type is generally condu
by the Institute. However, results of such tests appearing in publications
reports are carefully scrutinized for their significance in terms of the purp
of the Institute. In addition to advancing interdisciplinary research, the I
tute provides specialized training for graduate students.

The Institute conducts seminars, issues technical reports, and supplies in

n, lectures, and consultations to many government and industrial research velopment laboratories.

STITUTE FOR MANAGEMENT SCIENCE AND ENGINEERING

stitute for Management Science and Engineering defines and develops analytical management techniques required to keep pace with an ever-ex- ng technology. It provides a multidisciplinary environment for innovative te teaching and substantial opportunities for research activities and public e under diversified sources of external support. The principal academic directly involved are operations research, mathematics, statistics, econom- the computer sciences.

e programs of the Institute are concerned with important educational and -service needs for conservation of national resources. Such programs e full-time interaction among students, faculty, and staff in ways pos- only at universities. Through its Program in Logistics, the Institute per- research leading to the development of a science of logistics featuring ples and methodology for resource allocation problems in civil affairs and defense efforts. Other programs involve optimization, reliability, queu- recasting, and cost benefit analyses.

ticipation by faculty members and graduate students from all schools e University is encouraged as consistent with the multidisciplinary ob- s of the Institute. Graduate students are supported through research tships with thesis and dissertation efforts ordinarily being the major esponsibilities. Reliance is also placed on staff research specialists, and are special provisions for substantial contributions from distinguished visi- rom government, private industry, and other universities.

e Institute disseminates its results through seminars, colloquia, conferences, pecial series of monographs. All research is unclassified.

THE GWU–NASA-LANGLEY GRADUATE PROGRAM

e Washington University, in cooperation with the National Aeronautics pace Administration's Langley Research Center, has a full-resident grad- ngineering program at NASA-Langley, in Hampton, Va., approximately es south of Washington, D.C.

e program is open to qualified NASA employees and area residents. es may also be taken by nondegree students, with the approval of the tor. Students may be permitted to transfer a maximum of 6 semester of approved graduate course credit from other accredited institutions.

rses in the program are taught by NASA scientists and engineers and culty of the School of Engineering and Applied Science. NASA-Lang- extensive scientific and engineering facilities and equipment are utilized ver feasible.

e program at NASA-Langley leads to the degrees of Master of Science ctor of Science (by special permission of the appropriate department and to the Professional degree of Engineer in the fields of acoustics, s, environmental modeling (M.S. degree only), fluid mechanics and

thermal sciences, solid mechanics and materials engineering, structures an
namics, and electrical engineering and computer science.

Information regarding this program may be obtained from John L. W
sides, Jr., GWU-NASA Program, Mail Stop 69, NASA-Langley Research
ter, Hampton, Va. 23365.

The GWU–NASA-Langley Joint Institute for Advancement of Flight Sciences (JIAFS)

The Joint Institute for Advancement of Flight Sciences was established in
through the combined efforts of the National Aeronautics and Space Ad
tration's Langley Research Center and the George Washington Unive
School of Engineering and Applied Science. The objective of the JIAF
gram is to meet the nation's ever-increasing needs in the advancem
science, engineering, and technology and to prepare qualified students f
neers in research, development, design, and teaching. The Institute, wh
located at the Langley Research Center in Hampton, Virginia, is dedica
the advanced training of students and professional engineers in acoustics,
nautics, environmental modeling, materials science, structures and dyn
and other relevant areas, and serves to provide a center for advanced re
by bringing together researchers and scholars from these fields for the exc
of ideas and findings. It is also the purpose of the Institute to provi
necessary facilities for qualified researchers and scholars who want to
in research work in these areas.

The organization of the Institute consists of a director, John E. Dube
sociate Director of the NASA-Langley Research Center, and a co-di
Harold Liebowitz, Dean of the George Washington University's Sch
Engineering and Applied Science.

The education and research opportunities offered in the program combi
academic resources of George Washington University and the profes
research assets and facilities of the NASA-Langley Research Center.
opportunities also enable students to involve themselves in research p
that excite their interest and permit them to associate with prominent
members who are working on related problems. Most of the faculty
NASA scientists conduct research, and students take part in the intimate
ciation of research and instruction from the day of their arrival. It is be
that the experience of the students during their stay at NASA-Langley Re
Center will be highly rewarding and beneficial.

The current education and research programs are the following:

Acoustics Program.—This program is concerned with the problems of
ating noise and with providing a technical base for design of acceptable a
and space vehicles, noise resistant structures, and ground transportation sys
Areas of research interest include boundary-layer noise, duct acoustics, jet
nonlinear problems in acoustics, rotor noise, structural response to noise
chanical and acoustical coupling problems, and subjective response to noise
vibration.

Aeronautics Program.—This program deals with advanced flight concep
both STOL and V/STOL aircraft, including areas of performance, flight dy
ics, instrumentation, guidance and control, aeroelasticity, and systems ana
Specific research areas currently being investigated include aerodynamic
sis of jet augmented wings, theoretical fluid mechanics, performance, sta

ontrol of V/STOL aircraft, analysis and flow visualization of wingtip vor-
ind tunnel and flight testing of V/STOL aircraft, airfoil aerodynamics,
characteristics of aircraft, and experimental evaluation of aircraft
g characteristics.

uctures and Dynamics Program.—This program is designed to provide
understanding and working knowledge of some key areas pertinent to
ures, solid mechanics, and dynamics technology including computer-aided
optimum design of aircraft and of aerospace and other structures; and
namic and aeroelastic response of large and complex structures. Em-
will be placed not only on these individual areas but also on their inter-
nd interaction.

vironmental Modeling Program.—This program is aimed at develop-
athematical models of various aspects of atmospheric energy and mass
port and in applying these models both to the prediction of pollutant dis-
on and transport and to the interpretation of satellite and aircraft meas-
nts. Because of the complexity of the earth-atmosphere system, simplified
are necessary to understand the effects of pollutants on the energy bal-
he atmospheric circulation, and the chemistry of the system.

terials Science Program.—This program is concerned with analytic
experimental verification of processes which degrade mechanical properties
dvanced composites; analysis of corrosion and stress-corrosion of materials
vironments encountered by aerospace vehicles; analysis of creep and cyclic
materials, based on both deterministic models and multiparameter regres-
and prediction of mechanical properties of engineering materials in terms
mposition, processing conditions, and service history.

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ipating in these programs are Graduate Student Research Scholar Assist-
faculty from George Washington University, scientists and engineers from
.Langley, and visiting scientists and engineers.

umber of Research Scholar Assistantships are available to qualified stu-
eeking an outstanding opportunity for graduate study and research lead-
the degrees of Master of Science and Doctor of Science in the fields of
ics, Aeronautics, Environmental Modeling, Materials Science, and Struc-
and Dynamics. Applicants who are awarded Research Scholar Assistant-
will receive stipends of up to $8,000 a year for a Master of Science de-
and $9,000 a year for the Doctor of Science degree. Applications, a
brochure, and additional information may be obtained from Professor
Yuan, JIAFS, School of Engineering and Applied Science, George Wash-
University, Washington, D.C. 20052.

COOPERATIVE EDUCATION PROGRAM IN ENGINEERING

erative education is a process of education which formally integrates the
's academic study with work experience in cooperating employer organi-
s. The usual plan is for the student to alternate periods of college study
eriods of experience in appropriate fields of industry and government.
perience periods are considered an integral part of the student's educa-
Through the interaction of the study and work experiences, the student

enhances academic knowledge, personal development, and professional pr
tion. The teaching faculty, the coordinators, and the employing super
share in the educational process of the cooperative student.

The following factors are adhered to as closely as possible for the stu
working experience:

1. The student's employment is related as closely as possible to the f
study and to individual interest within the field.

2. The employment is considered to be a regular, continuing, and es
element in the educational process.

3. The working experience will ideally increase in difficulty and res
bility as the student progresses through the academic curriculum. Norma
salary of the student will increase accordingly.

The student's working experience in industry or government provid
opportunity to meet and work with men and women under varied cond
to get along with them, learn from them, respect them, and earn their r
Indeed, these advantages alone could be as important in shaping a youn
son's life as the opportunity to obtain experience in a chosen field.

International students face several constraints in finding jobs and shou
depend on cooperative education income as a financial aid. Internation
dents with permanent visas, however, will have better opportunities for jo

Advantages of Cooperative Education

Combines Theory and Practice.—By coordinating the work experie
industrial and governmental organizations with the campus education pro
theory and practice are closely integrated, and students find greater rele
in their studies. As a result of this alternation between academic and ind
environments, the student tends to understand the role and meaning of
environment, with a deeper appreciation for each.

Helps Finance Educational and Living Expenses.—The student's earnin
contribute substantially to financing his own education and living expenses.
ing to independence and contributing significantly to self-esteem and
fidence. As stated earlier, it is expected that as the working experien
creases in difficulty and responsibility as the student progresses throug
academic curriculum, the salary of the student will increase accordingly

Serves as a Bridge to the Future.—Cooperative education helps marke
orient students to the world of work. Most students are genuinely conc
about their future life work. They want to know more about the range of
pations open to them, and the potentials and limitations of these fields. Th
want to know about the qualifications demanded and their own fitness. Th
cooperative education programs, students have opportunities for exploring
own abilities in connection with real jobs, and they find a direct means of
ing information and guidance not only in the occupations in which they are
ployed but in a number of related fields as well. They have a chance to
their own aptitudes more fully than is normally possible on campus.

Increases Motivation to Achieve.—This coordination of work and stud
creases student motivation. As students see connections between jobs they
and the things they are learning in school, greater interest in academic w
develops. During the work periods there is a tendency for the student to
velop good work habits because his efforts as a productive and salaried empl
are rated by the employer.

...nces Human Relationships.—Because the work experiences involve the ...ts in relations with co-workers who come from a variety of backgrounds, ...ecause success in these jobs requires constructive relationships with col..., most students in cooperative education develop deeper understanding ...er people and greater skills in human relations.

...ments Development of Maturity.—For many students the work experi... contributes to an increased sense of responsibility for their own efforts, ...e dependence on their own judgments, and a corresponding development ...urity. In addition, the student's role as a team member in a real and pro... working environment inculcates a seriousness of life and purpose which ...en delayed for the traditional college graduate.

...nsibilities of the Cooperative Student

...ooperative student working in association with the professionals in the field ... adopt professional standards of conduct. Such a student is also a repre...e of the George Washington University School of Engineering and ...ied Science. After each work period the student prepares a report describ... the duties and responsibilities at work, and the supervisor sends an appraisal ... student's work performance to the Cooperative Program Coordinator. ... reports are reviewed with the student.

...e cooperative program is a three-way partnership among the student, the ...oyer, and George Washington University. The student's responsibilities ...d equally to each of the other two members of the partnership, and the ...ership cannot be altered during the program without the knowledge and ...ent of all.

...e cooperative student must maintain continuous registration in the School ...each semester the student is away from the School on a work period. ...ure to do so breaks the student's registration, and the student must apply ...readmission to the undergraduate degree program under whatever condi... and regulations are in effect at that time.

... Employers Participate in Cooperative Education Programs

...stry and government agencies have found that cooperative students are ...se employees. Generally speaking, they are alert and energetic young ...ple who, stimulated by a definite goal, return more than a day's work for a ... pay. Graduates of the cooperative program represent a good source of ...rained manpower. The training period provides an opportunity for the ...oyer to evaluate the student as a prospective permanent employee. Em... feel that this program is an important part of their effort to attract well... employees. At the same time, the student is able to evaluate the em... in terms of future plans and interests. About half of the cooperative ...ates establish such mutually beneficial relationships with their employers ... they remain in permanent employment after graduation, with a substantial ...start in their careers.

... emphasized, however, that neither the student nor the employer is ob... for permanent employment after graduation. Industry and government ...es consider participation in cooperative education as a long-range invest... rather than a current expense. As a partner with the University, the em... engaged in a joint effort to develop young talent more fully, thus as-

suring better education for the student, improved utilization of the grad
and greater cooperation with the University.

Scholastic Requirements

Students entering the program must be in good academic standing and
have completed at least two semesters of academic study prior to their firs
time work assignment. To remain in the program, the student must maint
passing average and perform satisfactorily for the employer.

Living Accommodations

Arrangements will be made for students in the cooperative program to
their dormitory and dining privileges at the University, if they so desire, d
the work periods. During this time, they will also retain full student priv
and have access to all University facilities. Faculty will be available for
sultation by appointment.

Work-Study Schedules

At this time, individual schedules are being arranged with the various em
ers in Washington and other areas. Since each employer operates differ
special schedules are arranged which are mutually satisfactory to the st
the employer, and the School.

Generally, after the student has successfully completed the first ye
study, a schedule is arranged with the employer. Many employers will r
the student to work during the summer immediately following the fres
year. The student returns to the School for the sophomore year, working
during the second summer. Beginning with the third year, students alterna
tween employer and classroom each semester for the next two years, retu
to the classroom for the fifth and final year. An alternate method is to w
full academic year and then return to school. Schedules for transfer stu
are arranged on an individual basis according to the number of credit
transferred and the employer's requirements.

Arrangements have been made or are in progress with many businesses, i
trial organizations, and governmental agencies for employment opportu
Few cooperative job opportunities, however, are available for the summe
prior to the freshman year.

COOPERATIVE PROGRAM WITH NAVY LABRATORIES

Arrangements have been made with the U.S. Naval Ship Research and D
opment Centers, Annapolis and Carderock, Md., and with other naval
oratories in which it is possible for the student to earn a substantial portio
educational expenses on planned technical work assignments, obtain a Bach
of Science degree in such areas as civil, electrical, or mechanical engineer
and be in a preferred position upon graduation to obtain a permanent Civil S
ice position with a grade and salary commensurate with the student's educa
and experience.

participate in the program at the naval laboratories, the student must be demically acceptable to the University and must meet the requirements of Civil Service Commission for employment at these laboratories.

tion Aid

der the Tuition Aid Program offered by the Navy, up to 50 percent of the of tuition, textbooks, and fees (exclusive of room and board) may be ced on request. If tuition assistance is received, the cooperative student l agree to serve as a government civilian employee after graduation for a od to be determined by regulations in effect at that time.

k Experience

is program integrates formal study at this School with practical work ex-rience, an essential element of the educational process. The employment is ted to the field of study in which the student is engaged, and it is diversified afford breadth of experience. The work experience increases in difficulty and ponsibility and, in general, parallels the student's progress through the aca-mic phases of the program.

As a Civil Service employee, the co-op student is eligible for many federal nefits, including annual leave, sick leave, paid holidays, health benefits, and insurance.

man Admission

plications for the cooperative education program should be submitted be-e March 1 of the senior high school year. Students graduating at mid-term wishing to begin study in the spring semester should apply no later than ember 1.

fer Student Admission

nsfer students from other institutions should submit cooperative education plications and required credentials prior to June 1 for the fall semester, De-ber 1 for the spring semester, and May 1 for the summer sessions. The nsfer student should be in good standing as to scholarship and conduct and uld be eligible to return to the last previously attended institution in the ester for which the student seeks admission to this University.

NDERGRADUATE DUAL-DEGREE PROGRAMS WITH HAMPTON INSTITUTE AND BOWIE STATE COLLEGE

e School of Engineering and Applied Science, Hampton Institute, and Bowie e College, all of which are accredited four-year degree-granting institutions, established a dual-degree program that joins general education and career ation in a unique and comprehensive experience. This program is in addi-

tion to the engineering programs already offered on the campus at G
Washington University.

Hampton Institute and Bowie State College offer several four-year
programs in a variety of disciplines. To provide opportunity for care
engineering, Hampton Institute and Bowie State College joined with the
of Engineering and Applied Science, which offers accredited four-yea
grams in engineering.

Students enrolled in the dual-degree program first follow a general p
study for three years at Hampton Institute or Bowie State College. Thi
gram is based on the social sciences, humanities, and the preparatory
ground engineering courses in mathematics, physics, and chemistry, whic
develop broad cultural perspectives, analytic abilities, and communi
skills.

After successful completion of the first phase of study, students then
a two-year career program in engineering at the School of Engineerin
Applied Science. During this phase of the study, students may specia
any of the following areas of engineering, which are also offered in G
Washington University's regular four-year programs:

1. Civil Engineering, or the following options: Environmental-oriented
Engineering, Computer-oriented Civil Engineering, Geotechnical Civil
neering.

2. Electrical Engineering, or the following options: Computer Science
medical Engineering.

3. Mechanical Engineering, or the following options: Energy Resources
Power, Computer-oriented Mechanical Engineering.

Some of the advantages of the dual-degree program follow.

Students may begin their education at Hampton Institute or Bowie
College and then obtain a B.S. in an engineering area from George Washi
University. This unique academic background provides the student with
options in choosing a profession upon graduation. The student may go
engineering practice, continue study for advanced degrees, or enter other
fessional areas such as law, medicine, or teaching.

Dual-degree students, while at Hampton Institute, may participate in
Summer Training Program. In this program, students may work for a 12-
period during the summer at the Joint Institute for Advancement of F
Sciences at the National Aeronautics and Space Administration's (NA
Langley Research Center in Hampton, Va., obtaining valuable work experi
in a first-rate laboratory while earning funds for the following academic
This program may be made available to some prefreshmen who desire to
upon graduation from secondary school.

Dual-degree students may avail themselves of summer employment thro
the George Washington University's Cooperative Education Program in E
neering prior to their actual attendance at George Washington University

In George Washington University's Cooperative Education Program in E
neering (see pages 37–40), a student may work summers and one or two
demic semesters and earn sufficient funds to help pay expenses while obtai
valuable engineering experience.

The dual-degree program offers the student time to become acclimated
college life and study at a reasonable cost while preparing for an exciting
rewarding profession.

r further information write or call Dean of Admissions and Registrar, on Institute, Hampton, Va. 32668, Phone (804) 727-5328 or 727-5329; r. Johnny W. Ponds, Mathematics Department, Bowie State College, e, Md., 20715, Phone (301) 262-3350; or Manager, Engineering Admis- School of Engineering and Applied Science, George Washington Univer- shington, D.C. 20052, Phone (202) 676-6158.

CONTINUING ENGINEERING EDUCATION PROGRAM

y most engineers and their employers are well aware of the rapid ad- of knowledge in science and technology. The inability to understand apply new technologies can mean both personal and corporate failure. vent this potential obsolescence, engineers must involve themselves in a uing program of technical reading and organized learning.

e School of Engineering and Applied Science meets this need with a com- ve program of noncredit courses. The program's objective is to in- the competence of practicing engineers rather than to grant further aca- degrees. Staff reorganizations require many engineers to change their ities or to take on additional duties within their present jobs. Continuing ring education can provide the education and skills the engineer needs to ely make these changes. Continuing Engineering education also aids in ng for promotions and in maintaining certification in certain professional

e program will present about 300 noncredit courses this year. About half last for five days (30 classroom hours), while others are for two, three, days. Some courses are presented in the evening (two-hour sessions a week for 10 to 12 weeks), or on Saturday morning. Presentation of is often augmented by workshops to give registrants practice in the spe- discipline. All courses stress practical applications. Students from all over tion and from many foreign countries have participated in courses. The of experience and background of these students enriches the classroom ions.

me of the subjects which have been presented in this program include:

istration of Safety Functions
g Circuit Design
ms Systems
ated Document Storage and
rieval
mand and Control Systems
puter-Aided Preliminary Ship
sign
ter Performance Evaluation
ter Security
unication Systems
ation Management of
re Programs
ation Management
truction Estimating
Critical Path Method
Data Communications
Digital Communications
Digital Image Processing of Sensor Data
Digital Integrated Circuits
Digital Signal Processing
Distributed Processing
ECM and ECCM for Digital Communications
Electromagnetic Compatability
Electromagnetic Wave Propagation
Electronic Display Technology
Energy Conservation
Environmental Impact Statements

Fault Tree Analysis
Fiber and Integrated Optics
Fibrous Composite Structures
Finite Element Method
Forecasting Techniques
Heat Pipes
Industrial Noise Control
Integrated Circuits
Intensive and Coronary Care Units
Laser Applications
Life Cycle Costing
Lubrication Technology
Maintenance Management of Medical Instrumentation
Management of Research and Development
Mathematical Theory of Reliability
Mechanical Reliability
Metal Fracture and Fatigue
Metric Conversion
Microprocessors and Microcomputers
Minicomputers
Monte Carlo Simulation
Municipal Solid Wastes
Nonlinear Programming
Nonparametric Statistics
Operations Research
OSHA for Government Agencies
Patent Law for Engineers
Photo- and Electro-Optical Imaging Systems
Practical Electronics
Project Management
Radar Systems
Reliability of Nuclear Power P
Satellite Communications
Satellites for Navigation and Air Traffic Control
Solar Heating and Cooling
Solid-State Electronics for Non-Electrical Engineers
Sonar Systems
Space Communications and Sy
Specifications and Standards
Speech Communication Aids f the Deaf
Spread Spectrum Communicati
Standards and Calibration Labs
Statistical Methods in Reliabili
Statistical Techniques in Biome Studies
Structured Programming
Switched Networks for Data Communications
Technical Training Program D
Technology Trends in Communications
Telecommunications
Telephone Equipment Registra for Voice/Data Interconnect
Temperature Control Systems
Working Statistics for Enginee
Writing Professional and Technical Communications

New courses are developed as needs become apparent in various field repeated courses are continuously revised. Over 70 new courses were adde year.

In addition to the faculty of the School of Engineering and Applied Sc outstanding lecturers and instructors from other universities, from industry from government laboratories and agencies serve on the instructional st the program.

The program also offers noncredit contract courses off campus specif tailored for the needs and background of the engineers employed by a com or agency. Tuition for these courses is usually slightly lower than for offered at the University. Eleven such courses were presented in fo countries last year.

To receive announcements or additional information on the program, to Continuing Engineering Education Program, School of Engineering Applied Science, George Washington University, Washington, D.C. 2005 call (202) 676-6106 or (800) 424-9773.

Administration

Liebowitz, D.Ae.E., *Dean of the School of Engineering and Applied ...ce; Co-director of the Joint Institute for Advancement of Flight Sci...; Director, Institute for the Study of Fatigue, Fracture, and Structural ...ability*

Elmer Feir, Ph.D., *Associate Dean of the School of Engineering and ...lied Science*

Gross, Ph.D., *Chairman of the Department of Operations Research*

...rd Pickholtz, Ph.D., *Chairman of the Department of Electrical Engi...ng and Computer Science*

...thman, Ph.D., *Chairman of the Department of Engineering Adminis...tion*

...wen Yuan, Ph.D., *Associate Director, Joint Institute for Advancement ...ght Sciences*

... Cambel, Ph.D., *Chairman of the Department of Civil, Mechanical, ... Environmental Engineering; Director, Energy Programs*

...en H. Marlow, Ph.D., *Director, Institute for Management Science and ...neering*

... Edward Duberg, Ph.D., *Director of the NASA-Langley Graduate Pro...; Director of the Joint Institute for Advancement of Flight Sciences*

...m P. Clark, M.S., *Administrator of the NASA-Langley Graduate Pro...*

... F. Shanahan, B.S., *Manager of Engineering Admissions and Coopera... Education Program*

...ndsey Whitesides, Jr., Ph.D., *Assistant Director, Research and Educa... Joint Institute for Advancement of Flight Sciences*

... Witherspoon, M.S., *Assistant Administrator of the NASA-Langley Grad... Program*

... Emerson Mansfield, B.S. in E.E., *Director of the Continuing Engineering ...cation Program*

...ne A. Hooper, M.S., *Research and Resources Officer*

...e Ellowitz, B.A., *Executive Associate to the Dean*

DEAN'S COUNCIL

... Liebowitz *(Chairman)*, R.R. Fox, T.G. Toridis, Henry Steiner

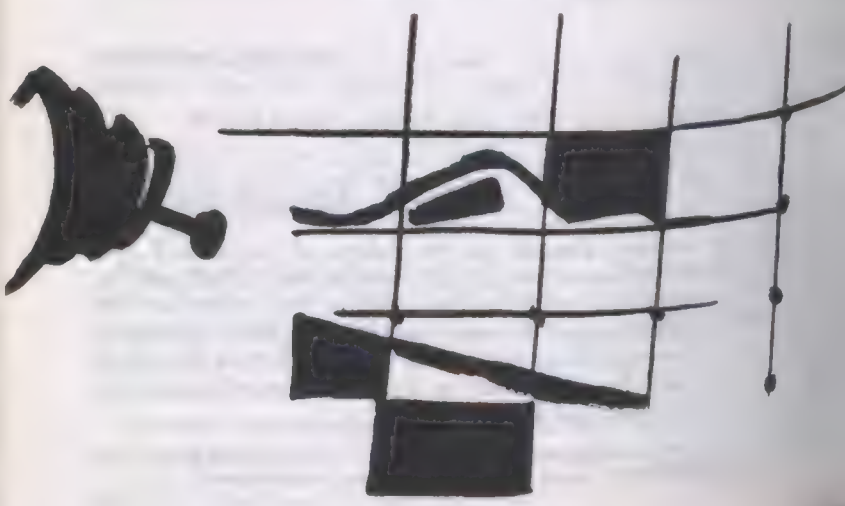
Advisory Council*

PURPOSES of the Advisory Council for the School of Engineering and ...ic Science are to strengthen communication between the School and the ... colleges, schools, and divisions of the University as well as between the ... and the University's Board of Trustees; to advise on the programs of ...tion, research, and service in the School and to help interpret these pro... to the community and the nation; and to stimulate support for the con...elopment of the School and its programs.

*...dent of the University, the Vice President for Academic Affairs, and the Dean of the ...Engineering and Applied Science are *ex-officio* members of the Advisory Council.

MEMBERS OF THE COUNCIL FOR 1978–79

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Potomac Electric Power Company
Raymond L. Bisplinghoff, *Tyco Laboratory*
Bruno A. Boley, *Dean, Technological Institute, Northwestern Universit*
George M. Bunker, *President, Martin Marietta Corporation*
J.P. Chambers, *President, Melpar Division E-Systems, Inc.*
L. Stanley Crane, *President, Southern Railway System*
Joseph Fox, *Director, Computer Systems, Decisions and Designs, Inc.*
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Martin Goland, *President, Southwest Research Institute*
William J. Harris, Jr., *Vice President, Research and Test Department*
ciation of American Railroads
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Ernst Weber, *Chairman, Division of Engineering, National Research Co*
Harold A. Wheeler, *Chief Scientist and Chairman, Hazeltine Corporati*
James F. Young, *Vice President—Engineering, General Electric Compan*
L.A. Zadeh, *Chairman, Department of Electrical Engineering and Co*
Sciences, University of California, Berkeley



PROGRAMS OF STUDY AND COURSES OF INSTRUCTION

THE FOLLOWING PAGES are listed programs of study, curricula, and courses ...ction offered by the School of Engineering and Applied Science. ...dents who are not candidates for degrees but who wish to take courses ... by the School should apply for admission to the Division of University ...

EXPLANATION OF COURSE NUMBERS

...es numbered from 1 through 199 are planned for undergraduate credit, ...gh certain courses may be taken for graduate credit when arrangements ...proved in advance by the instructor and the Dean. Courses numbered ...o. 300 are planned for graduate credit and may in certain instances be ...en by qualified undergraduate students. Courses numbered from 301 to ...are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

...number of semester hours' credit given for the satisfactory completion of ...urse is indicated in parentheses after the name of the course. Thus, a year ...se giving three hours of credit each semester is marked (3–3), and a ...ester course giving three hours' credit is marked (3). A semester hour con... of the completion of one 50-minute period of class work or of one lab... ...y period a week for one semester.

TIME OF COURSE OFFERINGS

...owing each course description is a parenthetical statement listing the semes... for which the course is scheduled to be offered. The term "academic year" is ...only with two-semester courses, and indicates that the first half of the ...se is to be offered in the fall semester and the second half in the spring ...ester; the term **"as arranged" is used for courses which could not be** ...ded at the time of printing this catalogue. Offerings for the summer ...ns are not designated in this catalogue. Students should consult the ...mer Sessions *Schedule of Classes* for summer offerings. A *Schedule of* ... is also published for each fall and spring semester which provides up-to-... information concerning the time of course offerings.

KEY TO ABBREVIATIONS

The following abbreviations for course designations are used by George
ington University.

Acct	Accounting
AmCv	American Civilization
Anat	Anatomy
Anes	Anesthesiology
Anth	Anthropology
ApSc	Applied Science
Art	Art
ArTh	Art Therapy
Bioc	Biochemistry
BiSc	Biological Sciences
BAd	Business Administration
Cart	Cartography
Chem	Chemistry
CH&D	Child Health and Development
Chin	Chinese
CE	Civil Engineering
Clas	Classics
ClEn	Clinical Engineering
CSci	Computer Science
Derm	Dermatology
Econ	Economics
Educ	Education
EPol	Education Policy
EE	Electrical Engineering
EAd	Engineering Administration
EngS	Engineering Science
Engl	English
EFL	English as a Foreign Language
EnHe	Environmental Health
Envr	Environmental Studies
Hum	Experimental Humanities
ForS	Forensic Sciences
Fren	French
Gnet	Genetics
Geod	Geodesy
Geog	Geography and Regional Science
Geol	Geology
Geop	Geophysics
Ger	Germanic Languages and Literatures
HCA	Health Care Administration
HCS	Health Care Sciences
Hist	History
HKLS	Human Kinetics and Leisure Studies
Idis	Interdisciplinary Courses
IAf	International Affairs
Ital	Italian
Japn	Japanese
Jour	Journalism
Law	Law
LEnf	Law Enforcement
Mgt	Management Science
Math	Mathematics
ME	Mechanical Engineeri
M&PA	Medical and Public A
Med	Medicine
Micr	Microbiology
Mus	Music
NSur	Neurological Surgery
Neur	Neurology
Ob&G	Obstetrics and Gynec
Ocea	Oceanography
OR	Operations Research
Opth	Ophthalmology
Oral	Oral Biology
Orth	Orthopedic Surgery
Otol	Otolaryngology
Path	Pathology
Phar	Pharmacology
Phil	Philosophy
Phys	Physics
Phyl	Physiology
PSc	Political Science
Port	Portuguese
Pchi	Psychiatry and Behavioral Sciences
Psyc	Psychology
PAd	Public Administratio
Rad	Radiology
Rel	Religion
SLP	Service Learning Pro
Slav	Slavic Languages and Literatures
Soc	Sociology
Span	Spanish
SpEd	Special Education
SpDr	Speech and Drama
Stat	Statistics
Surg	Surgery
TCom	Telecommunication Operations
U&RP	Urban and Regional P
Urol	Urology
WStu	Women's Studies

Applied Science

partmental offerings.

UNDERGRADUATE COURSES

57 **Analytical Mechanics I** (2)

First half of a one-year sequence. Concepts of statics, including force systems, equilibrium conditions, simple structures, distributed forces, shear and moments, friction and the concept of work, virtual work and stability. Prerequisite or concurrent registration: ApSc 113, Phys 14. (Fall and spring)

58 **Analytical Mechanics II** (3)

Second half of a one-year sequence. Concepts of dynamics, including kinematics of particles, velocity and acceleration, Newton's laws of motion, momentum, work, kinetic energy, potential energy, central force fields, vibrations, resonance, dynamics of systems of particles, kinematics of a rigid body, dynamics of a rigid body. Prerequisite: ApSc 57. (Fall and spring)

113 **Engineering Analysis I** (3)

Analytical methods appropriate to the solution of engineering problems, including applications of ordinary differential equations, matrices and determinants, eigenvalues and eigenvectors, systems of ordinary linear differential equations, Bessel and Legendre functions. Prerequisite: Math 33. (Fall and spring)

114 **Engineering Analysis II** (3)

Analytical methods appropriate to the solution of engineering problems, including complex variables, Fourier series and integral, orthogonal functions, Laplace transforms, partial differential equations in engineering and applied science. Prerequisite: ApSc 113. (Fall and spring)

115 **Engineering Analysis III** (3)

Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing, correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32. (Fall and spring)

116 **Engineering Analysis IV** (3)

Solution of engineering problems using advanced concepts from probability and statistics applied to problems of engineering design, bioengineering, production processes, engineering management, and societal engineering. Prerequisite: ApSc 115. (Fall and spring)

GRADUATE COURSES

211 Analytical Methods in Engineering I (3)

Engineering applications of the theory of complex variables in contour integration, conformal mapping, inversion integral, and ary-value problems. Prerequisite: approval of Department. (F spring)

212 Analytical Methods in Engineering II (3)

Analytical methods appropriate to the formulation of engineerin lems including finite dimensional vector spaces, eigenvalue proble eralized Fourier series, tensor calculus, curvilinear coordinates. P site: approval of Department. (Fall)

213 Analytical Methods in Engineering III (3)

Analytical techniques for solution of boundary-initial problems i neering involving wave propagation, diffusion processes, and p distributions. Prerequisite: approval of Department. (Fall and

214 Analytical Methods in Engineering IV (3)

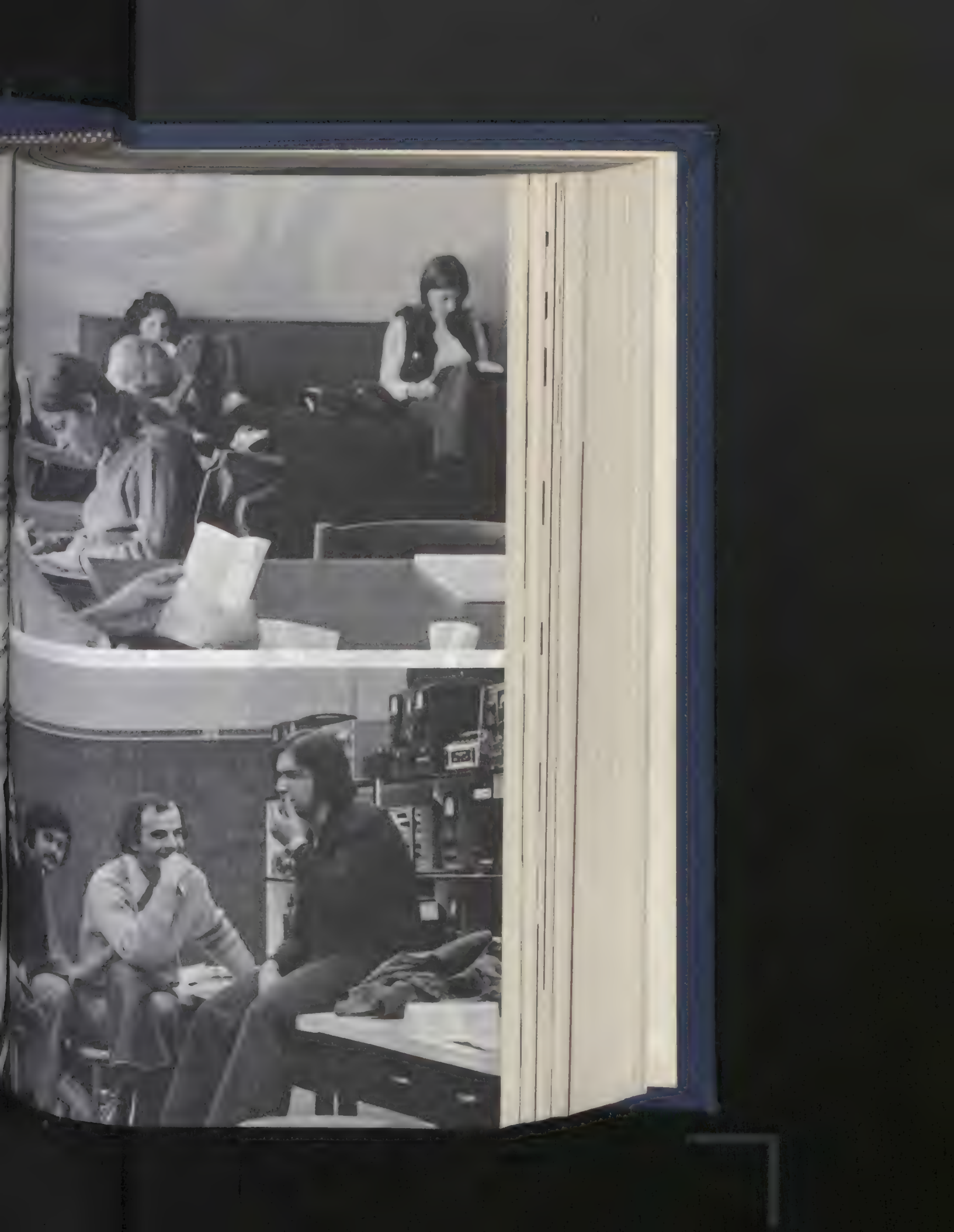
Introduction to variational methods in engineering including Ri Galerkin approximation methods of boundary-value problems. Asp linear integral equations arising from engineering analysis. Prere approval of Department. (Spring)

215 Analytical Methods in Engineering V (3)

Advanced methods of solution of boundary-initial value problems i neering, including characteristics, wave propagation, and Green's fu Prerequisite: ApSc 213. (Fall)

216 Special Topics in Engineering Analysis (3)

Selected topics such as (1) perturbation techniques applied to appro solution of nonlinear boundary and initial value problems in engi (2) application of singular integral equations in problems of mix (3) applications of elements of functional analysis in engineerin science. Prerequisite: approval of Department. (Spring, even ye




Civil,
Mechanical,
and Environmental
Engineering

Civil, Mechanical, and Environmental Engineering

...ors G.M. Arkilic, R.R. Fox, H. Liebowitz, S.W. Yuan, J. Foa, J.E. Feir, ... Toridis, J.P. Campbell *(Research)*, J. Eftis, A.K. Noor, R. Goulard, ... Cambel *(Chairman)*, K. Mahmood, A.M. Kiper, M.K. Myers, J.N. ... R.E. Kaufman

...t *Professors* J.E. Duberg, B.L. Clarkson, R.M. Sorensen, W.P. Reid, ... Liverman

...orial *Lecturers* R.E. Fulton, M.P. Gaus, R. Dillon, C. Molloy, M.J. ...ph, J.B. Scalzi, P. Donely, M.K. Ochi, R.F. Baker, L.K. Loftin, Jr., L. ...ore, L.G. Herman, R.M. Thomson, M. Yachnis, R.F. Hoglund, R.S. ...re, W. Viessman, Jr., F.J. Stanek, Y. Wu, R.S. Greeley, D.A. Linger, ... Butcher, K.H. Jones, W.D. Erickson, J.A. Belding, Jr., N.L. Basdekas, ...Chang, M.S. Ojalvo

...ate *Professors* M.K. Myers, D.L. Jones, J.L. Whitesides, Jr., C. Gil- ...r, H. Runyan, Jr. *(Research)*, D.M. Esterling *(Research)*, A.M. Bloom ...earch), J.N. Yang, R.E. Kaufman, R.S. Brice *(Research)*, E.S. Geskin ...earch), P.H. Blinco *(Research)*, V.P. Singh *(Research)*, B.R. Barkstrom ...earch), V. Klein *(Research)*

...t *Associate Professor* B.W. Hannah

...ate *Professorial Lecturers* R.W. Fralich, E.C. Yates, Jr., J. Sobieszczanski, ...tein, G. Sabnis, R.B. Samworth, D. Ellison, J.B. Fisher, R.W. Barnwell, ...Sonfau, R.J. Fisher, T. McGean, K. Saczalski, T.M. Walsh, P.B. Buck, ... Skelton, H.A. Leybold, A.G. Adamantiades, R.M. Brown, J. Ettinger, ... Bethel, D.D. Moran, T.F. Zien, E. Glynn, P.L. Coe, Jr., C.J. Jachimow- ...M.C. Cullingford, D. Feit, R. McConnell, W.J. Walker, J.C. Hardin, ... Tenney, H.S. Lew, G.D. Love, A.M. Yen, D.R. Levin, J.C. Yu, M.M. ...sen, R.Y. Ting, S.C. Liu

...t *Professors* K. Khozeimeh *(Research)*, J.D. Lee *(Research)*, F. Farassat ...earch), A.J.H. Tay, R.K. Kao *(Research)*, P.K. Poulous *(Research)*

... *Assistant Professor* A.K. Trehan

...t *Professorial Lecturers* J.A. Gorman, I.E. Beckwith, R.L. Bowles, ... Robertson, G.L. Smith, J.E. Carter, R.C. Montgomery, K.S. Park, T.A. ...ger, J.N. Shoosmith, D. Mulville, S.M. Finger, A. Kehnemui, M. Rozan- ...W.J. Boettinger, M.O. Critchfield, J. Hebrank, D.F. Hollingshead, C. Ng, ... Beach, Jr., D.D. Loendorf, G.D. Walberg, E.N.C. Dalder ...er R. Lee

CIVIL ENGINEERING—UNDERGRADUATE STUDY

...ngineering encompasses those branches of engineering activities most ...elated to the control and improvement of our environment and of the ...ns of life. Study in this field prepares students for careers in the plan- ...design, and construction of buildings; bridges; roads; airports; rapid ...sation systems; harbors; off-shore facilities; coastal protection struc- ...and pollution control systems for rivers, estuaries, and lakes; inland ... systems; large power generation and flood control dams; water re- ...ojects; urban renewal and development projects; and pollution con- ...waste disposal projects. It also provides the scientific and technological

background required for careers in municipal engineering, urban and regio
planning, and environmental and geotechnical civil engineering; and for care
in engineering research in structural mechanics, ocean engineering, and
terials engineering.

The curriculum provides the essentials for beginning a career upon grad
tion, for registration as a professional civil engineer as required by law, and
continuing study at the graduate level.

Evening Classes

In response to requests from those employed full time in the Washington, D
area who wish to obtain a Bachelor of Science degree in Civil Engineering
a reasonable period of time, evening classes in the Civil Engineering curr
lum are scheduled on a regular basis. For example, if a part-time student
rolls for three courses a semester, B.S. degree requirements can be comple
in less than 15 semesters.

Core Curriculum

Normally the first four semesters are common to all undergraduate fields in
School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30–31:	Precalculus and Calculus of One Variable (3)*
or	
Math 31:	Calculus of One Variable (3)
Phys 3:	Foundations of Physics (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EngS 4:	Descriptive Geometry and Drafting (3)
Math 32:	Calculus of Several Variables (3)†
Math 33:	Calculus of Vector Functions (3)†
Phys 14:	Introductory Mechanics and Thermal Physics (3)
Elective:	Selected from humanities or social sciences (3)

Third Semester

ApSc 57:	Analytical Mechanics I (2)
ApSc 113:	Engineering Analysis I (3)
ApSc 115:	Engineering Analysis III (3)

* Transfer students who have not successfully completed a college-level calculus course with a
of *C* or better from an accredited institution, or high school students who did not take an adva
placement (AP) calculus course and receive a score of 4 or 5 on the AP test, will be required
take a one-hour locally administered math placement test at registration. This test covers alg
trigonometry, and graphs. Students who do not place directly into Math 31 (Calculus) as a resul
this test will be required to undertake a combined pre-calculus and calculus course (Math 30-
during their first semester; this combined course meets five hours per week and carries three semes
hours of credit if the student completes the second half.

† Math 32 and Math 33 may be taken in a one-semester combined course, Math 32-33.

em 13: General Chemistry (4)
ys 15: Elements of Electricity and Magnetism (3)
ective: Selected from humanities or social sciences (3)
(May be taken during the Summer Sessions)

Fourth Semester

ac 58: Analytical Mechanics II (3)
th 114: Engineering Analysis II (3)
CE 110: Introduction to Environmental Engineering (3)
CE 140: Materials Science (3)
ys 16: Introduction to Modern Physics (3)
ective: Selected from humanities or social sciences (3)
(May be taken during the Summer Sessions)

ngineering Curriculum

Fifth Semester

CE 120: Introduction to the Mechanics of Solids (3)
CE 123: Structural Theory (6)
CE 166: Materials Engineering (2)
CE 167: Mechanics of Materials Laboratory (1)
ME 131: Thermodynamics (3)

Sixth Semester

CE 183: Urban Planning (3)
CE 190: Legal and Economic Aspects of Engineering (2)
eol 136: Engineering Geology (3)
ME 126: Fluid Mechanics (3)
Elective: Selected from humanities or social sciences (6)

Seventh Semester

CE 168: Introductory Soil Mechanics (3)
CE 191: Metal Structures (3)
CE 193: Hydraulics (3)
CE 194: Environmental Engineering I: Water Supply and Resources (3)
Elective: Technical electives (6)

Eighth Semester

CE 182: Foundation Engineering (2)
CE 185: Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192: Reinforced Concrete Structures (3)
CE 197: Environmental Engineering II: Waste and Pollution Control (3)
Elective: Technical electives (5)

Technical Electives

*CE 195: Hydrology (3)
*CE 196: Design and Cost Analysis of Civil Engineering Structures (3)
CE 198: Research (2)

* Courses which must be selected from the technical electives.

CE 201:	Design of Metal Structures (3)
CE 202:	Design of Reinforced Concrete Structures (3)
CE 204:	Applied Soil Mechanics I (3)
CE 205:	Applied Soil Mechanics II (3)
CE 206:	Foundation Engineering (3)
CE 210:	Methods of Structural Analysis (3)
CE 212:	Open Channel Flow (3)
CE 213:	Hydraulic Structures (3)
CE 214:	Design of Dams (3)
CE 215:	Urban Construction Technology (3)
CE 216:	Advanced Hydrology (3)
CE 220:	Urban Transportation Engineering (3)
CE 243:	Environmental Impact Assessment (3)
CE 253:	Failure and Reliability Analysis of Engineering Structures (3)
EAd 150:	Introduction to Engineering Administration (3)
EngS 215:	Advanced Strength of Materials (3)
EngS 234:	Composite Materials (3)

Computer-oriented Civil Engineering Option

The expanding use of computers in the design and control of engineering
tems provides increasing opportunities for engineering careers in which
ficiency in the sophisticated use of digital and other computers is essen
This option replaces several technical electives of the principal professio
undergraduate program with electives that provide a more comprehensive
posure to computer technology and applications.

Technical Electives for Computer-oriented Civil Engine
Option

*CE 196:	Design and Cost Analysis of Civil Engineering Structures (3)
CE 198:	Research (2)
CE 210:	Methods of Structural Analysis (3)
CSci 278:	Analog and Hybrid Computers (3)
EE 152:	Introduction to Digital Computers (3)
EngS 282:	Computer-aided Design (3)
EngS 283:	Application of Computer Graphics in Engineering (3)
EngS 284:	Numerical Methods in Engineering (3)

Environmental-oriented Civil Engineering Option

The world-wide growth of industrialization is causing increasing concern
protection of the human environment. Part of this problem involves w
supply and treatment, pollution of rivers, lakes, and oceans, and solid wa
treatment and disposal. Through a selective choice of technical electives
student is provided with an opportunity to gain increased exposure to this
veloping aspect of civil engineering.

Technical Electives for Environmental-oriented Civil Engine
ing Option

Bioc 221:	General Biochemistry (3 or 4)
BiSc 11–12:	Introductory Biology for Science Majors (4–4)

* Required course which must be selected from the technical electives.

hem 50: Introduction to Organic Chemistry (4)
CE 195: Hydrology (3)
CE 196: Design and Cost Analysis of Civil Engineering Structures (3)
CE 198: Research (2)
CE 240: Environmental Microbiology (3)
CE 241: Environmental Chemistry (3)
CE 242: Solid Waste Disposal (3)
CE 243: Environmental Impact Assessment (3)
ES 242: Materials Recycling and Recovery (3)
ME 176: Environmental Engineering Problems (3)
Micr 211: Microbiology (4)

nical Civil Engineering Option

nical civil engineering encompasses engineering problems involving chanics, foundation engineering, rock mechanics, and geological as- engineering. More specifically, planning, designing, and erecting struc- ended on or made of soil and rock constitute the main features of this of civil engineering. Included are the design and construction of founda- r all types of buildings, bridges, and highway and airfield pavements; nd construction of earth- and rock-fill dams, embankments, waterfront es, tunnels, and drainage facilities; and stabilization procedures for ion of marginal lands. Engineering geology, which is the application of . data, principles, and interpretations to naturally occurring earth and ials, constitutes an important part in the planning and design stages of neering structures of the above type. The Geotechnical Civil Engineer- n provides the student with the fundamentals for subsequent growth elopment in this branch of civil engineering.

ULUM

site: first four semesters as described in the Core Curriculum, see , with the following changes:
Semester: *Geology 21 *Physical and Evolutionary Geology* (3) will n instead of the elective.
th Semester: *Geology 122 *Structural Geology* (3) will be taken in- of (a) CE 110 *Introduction to Environmental Engineering* and (b)

Fifth Semester

E 120: Introduction to the Mechanics of Solids (3)
E 123: Structural Theory (6)
E 131: Thermodynamics (3)
ol 163: Sedimentation (4)

Sixth Semester

E 126: Fluid Mechanics (3)
E 190: Legal and Economic Aspects of Engineering (2)

Geology, and Microbiology course descriptions, see the *Undergraduate and Graduate*
course which must be selected from the technical electives.

*Geol 128:	Geomorphology (3)
*Geol 136:	Engineering Geology (3)
Electives:	Selected from humanities or social sciences (6)

Seventh Semester

CE 168:	Introductory Soil Mechanics (3)
CE 191:	Metal Structures (3)
CE 193:	Hydraulics (3)
CE 194:	Environmental Engineering I: Water Supply Resources (3)
CE 195:	Hydrology (3)
*Geol 189:	Geophysics for Geologists (3)

Eighth Semester

CE 182:	Foundation Engineering (2)
CE 185:	Soil Mechanics and Foundation Engineering Laboratory (1)
CE 192:	Reinforced Concrete Structures (3)
*Geol 195:	Field Work (2)
Electives:	Selected from humanities or social sciences (6)
Elective:	Technical elective (2)

Civil Engineering Undergraduate Courses

110 Introduction to Environmental Engineering (3)

An introductory study of environmental resources and their uses. As considered will include water resource systems; air and water qua solid waste and wastewater disposal systems; noise pollution; treat processes; environmental impact analysis and environmental plann Prerequisite: Chem 13. (Spring)

120 Introduction to the Mechanics of Solids (3)

Three-dimensional strain and stress. Constitutive equations for el viscoelastic, and plastic materials. Axial load, bending and torsion struts and beams. Instability and failure. Prerequisite: ApSc 57 and (Fall)

123 Structural Theory (6)

Theory of determinate and indeterminate structures using both clas and modern approaches. Prerequisite or concurrent registration: CE (Fall)

140 Materials Science (3)

Electron structure of atoms; atomic and molecular bonding; en bands; crystal structure; imperfections; noncrystalline solids; rea rates; diffusion; transport phenomena—thermal conductivity, electr conduction; metals, insulators, semiconductors; magnetism. Prerequis Chem 13; concurrent registration: Phys 16. (Spring)

166 Materials Engineering (2)

Mechanical properties and their description; effect of microstructure the mechanical behavior of metals, ceramics, polymers, and polyph materials; effect of strain-rate and temperature; creep, fatigue,

* For Geology course descriptions, see the *Undergraduate and Graduate Bulletin.*

fracture; effect of surface and environment; materials evaluation for structural performance. Prerequisite: CE 140; concurrent registration: CE 120. (Fall)

167 **Mechanics of Materials Laboratory** (1)

Measurement of strains and study of failure resulting from applied forces; ductile, brittle, anisotropic, elastomeric, and plastic materials; tension, compression, bending, creep, and fatigue loading. Prerequisite or concurrent registration: CE 166. (Fall)

168 **Introductory Soil Mechanics** (3)

Engineering properties of soils; analysis of lateral earth pressures, bearing capacity, foundations, and slope stability. Prerequisite: CE 120, ME 126. (Fall)

182 **Foundation Engineering** (2)

Subsurface exploration, design of shallow foundations, design of pile foundations, earth-retaining structures. Prerequisite: CE 168. (Spring)

183 **Urban Planning** (3)

Engineering aspects of urban planning, including transportation, water supply and sewerage, public utilities, safety and convenience, and natural environment. (Spring)

185 **Soil Mechanics and Foundation Engineering Laboratory** (1)

Laboratory experiments for the classification, strength, compressibility, and general engineering properties of soils. Prerequisite: CE 168. (Spring)

190 **Legal and Economic Aspects of Engineering** (2)

Laws relating to engineering practice, preparation of contract documents and specifications, consideration of economic factors in engineering design decisions. (Spring)

191 **Metal Structures** (3)

Principles of the design of metal structures; structural elements; connections; specific problems of analysis; methods of construction. Prerequisite: CE 123. (Fall)

192 **Reinforced Concrete Structures** (3)

Principles of the design of reinforced concrete structures. Details of reinforcement of structural elements. Monolithic structures, precast elements, methods of construction. Prerequisite: CE 123. (Spring)

193 **Hydraulics** (3)

Fluid statics: applications to calculation of boundary forces in a static fluid, buoyancy, and flotation. Application of kinematic principles; flow fields, stream tubes, and flow nets. Fluid dynamics: applications to pipe flow, hydraulic models, measurement of pressure, and velocity. Open channel flow: applications to water resources engineering. Prerequisite: ME 126. (Fall)

194 **Environmental Engineering I: Water Supply and Resources** (3)

Planning and design of water supply and waste-water disposal systems. Water quality control and treatment processes. Desalination, stream pollution control. Prerequisite or concurrent registration: CE 193. (Fall)

195 **Hydrology** (3)

Descriptive hydrology: hydrologic cycle, precipitation, stream flow, oration, and transpiration. Quantitative hydrology: hydrograph ana estimating volume of runoff, runoff from snow, hydrographs of basin flow, storage routing. Probability concepts in hydrology: flood frequ rainfall frequency, drought, stochastic hydrology. Prerequisite or current registration: ApSc 115, ME 126, CE 193. (Fall)

196 **Design and Cost Analysis of Civil Engineering Structures** (3)

Design of civil engineering structures such as wharves, piers, bulkh tunnels, dams, bridges, water treatment, and drainage systems. Prer site: senior status. (Spring)

197 **Environmental Engineering II: Waste and Pollution Control** (3)

Disposal of sewage, biological treatment, chemical treatment, filtra activated sludge, sludge handling and disposal. Control of indu wastes and of nuclear waste products. Solid waste disposal. Prerequ CE 193. (Spring)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequi junior or senior status. (Fall and spring)

MECHANICAL ENGINEERING—UNDERGRADUATE STUDY

Mechanical engineering is primarily concerned with physical systems in tion. A mechanical engineer is concerned with the conversion, transfer, control of energy from its source to its moving system. Land and marine hicles, transportation systems, air-conditioning systems, nuclear reactors fuel cells, low-pollution control devices, energy resources and the means of p tical and economical conversion of the various forms of energy to mecha and electrical power, and a host of other devices lie in this domain. Train in this area should provide the ability to formulate problems based on fun mental laws of nature, to recognize the types of methods which are applic to their solution, to read with understanding the relevant work, and to co up with a usable answer. The mechanical engineering curriculum provide background for careers in research, design, development, and manufactur a wide variety of industries.

Course offerings in mechanical engineering, which begin with a be foundation in physics, chemistry, mathematics, humanities, and social scien consist of studies in basic mechanics of solids and fluids, electricity a electronics, material sciences, dynamic analysis, thermal sciences, energy c version and power, environmental control, and the design of machines a systems and their control. Technical electives in the senior year allow stude interested in computers to select an option which will prepare them for care in computing as well as graduate study in computer-dominated or comput oriented professional fields. The program outlined below is based on the c cept that the mechanical engineer must be prepared to meet the challenges ever-increasing technical, economic, and social problems.

Graduates are qualified for professional positions in design, analysis, ma facture, and application of machines, process, and control, or in research a development, as well as for graduate work.

Classes

nse to requests from those employed full time in the Washington, D.C., who wish to obtain a Bachelor of Science degree in Mechanical Engineer- reasonable period of time, evening classes in the Mechanical Engineer- riculum are scheduled on a regular basis. For example, if a part-time enrolls for three courses a semester, B.S. degree requirements can be ed in less than 15 semesters.

Year Abroad Program

School of Engineering and Applied Science and the Institute of Sound and on Research of the University of Southampton, England, have estab- an exchange program so that graduate students in acoustics at both insti- may transfer academic credits to either University in fulfillment of the ments for advanced degrees. A special arrangement has now been made nd the graduate exchange program to the undergraduate level, enabling echanical engineering students to spend the junior year abroad.

program furthers a student's particular academic interests in mechanical ering and develops knowledge of world affairs in general, and inter- echnical fields in particular.

cants must apply for admission to the Junior Year Abroad program to partment Chairman before the end of the fall semester of the sophomore Approval must be given by the Department Chairman and the Dean of chool of Engineering and Applied Science.

Curriculum

ally the first four semesters are common to all undergraduate fields in the of Engineering and Applied Science.

First Semester

E 51: Applications of Computers (3)
th 30–31: Precalculus and Calculus of One Variable (3)*
or
th 31: Calculus of One Variable (3)
ys 3: Foundations of Physics (3)
9 or 10: English Composition: Language as Communication (3)
ective: Selected from humanities or social sciences (3)

Second Semester

gS 4: Descriptive Geometry and Drafting (3)
th 32: Calculus of Several Variables (3)†
th 33: Calculus of Vector Functions (3)†
ys 14: Introductory Mechanics and Thermal Physics (3)
ective: Selected from humanities or social sciences (3)

students who have not successfully completed a college-level calculus course with a grade from an accredited institution, or high school students who did not take an advanced AP) calculus course and receive a score of 4 or 5 on the AP test, will be required to ster locally administered math placement test at registration. This test covers algebra, and graphs. Students who do not place directly into Math 31 (Calculus) as a result of be required to undertake a combined pre-calculus and calculus course (Math 30–31) the semester; this combined course meets five hours per week and carries three semester if the student completes the second half.

th 33 may be taken in a one-semester combined course, Math 32–33.

Third Semester

ApSc 57:	Analytical Mechanics I (2)
ApSc 113:	Engineering Analysis I (3)
ApSc 115:	Engineering Analysis III (3)
Chem 13:	General Chemistry (4)
Phys 15:	Elements of Electricity and Magnetism (3)
Elective:	Selected from humanities or social sciences (3) (May be taken during the Summer Sessions)

Fourth Semester

ApSc 58:	Analytical Mechanics II (3)
ApSc 114:	Engineering Analysis II (3)
CE 140:	Materials Science (3)
EE 11:	Linear Networks I (3)
Phys 16:	Introduction to Modern Physics (3)
Elective:	Selected from humanities or social sciences (3) (May be taken during the Summer Sessions)

Mechanical Engineering Curriculum

Fifth Semester

CE 120:	Introduction to the Mechanics of Solids (3)
CE 166:	Materials Engineering (2)
CE 167:	Mechanics of Materials Laboratory (3)
ME 131:	Thermodynamics (3)
ME 134:	Introduction to Vibration Analysis (3)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

EE 20:	Introductory Engineering Electronics (3)
EE 172:	Control Systems (3)
ME 120:	Methods of Engineering Experimentation (2)
ME 126:	Fluid Mechanics (3)
ME 148:	Thermodynamic Analysis (3)
Elective:	Selected from humanities or social sciences (3)

Seventh Semester

ME 155:	Compressible Fluid Flow (3)
ME 187:	Heat Transfer Theory (3)
ME 190:	Mechanisms, Analysis, and Synthesis (3)
ME 191:	Mechanical Design (3)
Elective:	Technical electives (6)

Eighth Semester

ME 152:	Mechanical Engineering Laboratory (2)
ME 193:	Engineering Systems Design (3)
ME 194:	Energy Conversion (3)
Elective:	Technical electives (6)

Technical Electives

CE 197:	Environmental Engineering II: Waste and Pollution Control (3)
EAd 150:	Introduction to Engineering Administration (3)
EAd 160:	Introduction to Engineering Economic Analysis (3)

ApSc 215: Advanced Strength of Materials (3)
ME 176: Environmental Engineering Problems (3)
ME 215: Theory of Vibrations (3)
ME 221: Intermediate Fluid Mechanics (3)
ME 225: Turbomachinery I (3)
ME 237: Propulsion I (3)
ME 240: Kinematic Synthesis (3)
ME 247: Fluidics (3)

Technical Electives for Computer-oriented Mechanical Engineering Option

ChSci 278: Analog and Hybrid Computers (3)
EE 152: Introduction to Digital Computers (3)
EE 157: Machine and Assembly Language Programming (3)
EngS 282: Computer-aided Design (3)
EngS 283: Application of Computer Graphics in Engineering (3)
EngS 284: Numerical Methods in Engineering (3)
ME 176: Environmental Engineering Problems (3)

Technical Electives for Energy Resources and Power-oriented Mechanical Engineering Option

EE 177: Electrical Energy Conversion (3)
EngS 208: Energy Conservation (3)
EngS 214: Geothermal Energy (3)
ME 176: Environmental Engineering Problems (3)
ME 224: Fundamentals of Combustion Engines (3)
ME 225: Turbomachinery I (3)
ME 237: Propulsion I (3)
ME 259: Solar Heating and Cooling Systems (3)
ME 260: Heating, Refrigeration, and Air Conditioning (3)
ME 283: Nuclear Reactor Engineering I (3)
ME 294: Wind Energy (3)

...ical Engineering Undergraduate Courses

...20 **Methods of Engineering Experimentation** (2)

Acquisition and analysis of experimental data. Laws of modeling and simulation. Report formulation and presentation. Basic principles of various measuring instruments and sensors. Laboratory experiments, including use of strain gages, oscilloscopes, various tranducers, etc. Introduction to basic experimental techniques related to dynamics, fluid flow, and thermal sciences. Prerequisite: CE 120, ME 131. (Spring)

...26 **Fluid Mechanics** (3)

Fluid properties, regimes in fluid mechanics, fluid statics, fluid kinematics, basic equations, one- and two-dimensional inviscid incompressible flow, viscous incompressible flow, dimensional method. Prerequisite: ApSc 58. (Spring)

...3: **Thermodynamics** (3)

Fundamental thermodynamic concepts, Zeroth law of thermodynamics and temperature measurements, work and heat, first law of thermody-

...ineering subjects must be selected from the technical electives.

namics, properties of pure substances, first-law analysis of some ther
dynamic systems, second law of thermodynamics, reversibility, entr
second-law analysis of thermodynamic systems. Prerequisite or concur
registration: ApSc 58. (Fall)

134 **Introduction to Vibration Analysis** (3)

Natural frequencies and response of single- and multiple-degree of
dom mechanical systems to dynamic loads. Effect of damping, tran
and steady-state analysis. Prerequisite: ApSc 58. (Fall)

148 **Thermodynamic Analysis** (3)

Analysis of thermodynamic power and refrigeration cycles; therm
namics of mixtures of substances; properties of air-water vapor mixt
psychrometry and analysis of cooling tower and air-conditioning p
third law of thermodynamics and absolute entropy; evaluation of com
tion processes. Molecular distributions and models; introduction to
tistical and quantum mechanics; statistical thermodynamics and therm
namic properties of gases and solids. Prerequisite: ME 131. (Spr

152 **Mechanical Engineering Laboratory** (2)

Experimental study of various engineering systems. Laboratory proj
include experimental design, modeling and simulation parameters,
acquisition, and report presentation techniques. Prerequisite: ME
(As arranged)

155 **Compressible Fluid Flow** (3)

Introduction to compressible flow, basic equations, propagation of m
in compressible fluids, isotropic-flow relations, steady one-dimensi
flow, wave phenomena, small perturbation theory, slender-body the
method of characteristics. Prerequisite: ME 126, 131. (Fall)

176 **Environmental Engineering Problems** (3)

Classification and effects of air pollutants; air-quality criteria and st
ards; analysis of pollutants; sources of pollutants and emission invent
emission-control equipment. Water-quality standards; sewage and in
trial waste characterization and pollutional effects in natural waters
mary, biological, and tertiary treatment of wastes; sludge handling
disposal. Prerequisite: senior status. (Fall)

187 **Heat Transfer Theory** (3)

Heat transfer processes. General heat conduction equations; steady-
unsteady-state heat conduction problems. Methods of analysis; analyt
analog, and numerical solution methods. Fundamentals of convective-
transfer. Evaluation of convective-heat transfer coefficients; dimensi
analysis, boundary-layer approach, analogy between heat and momen
transfer. Energy exchange by thermal radiation; fundamental conce
and laws, radiation properties, radiative-heat transfer between surfa
Design considerations; heat-exchanger design and selection. Prerequis
ME 126. (Fall)

190 **Mechanisms, Analysis, and Synthesis** (3)

Kinematics and dynamics of mechanisms. Displacement, velocities, an
erations in linkage and cam systems by analytical and graphical metho
Prerequisite: ApSc 58. (Fall)

191 **Mechanical Design** (3)

Introduction to design concept, selection of materials, and strength
mechanical elements; design of machine components such as shaf

springs, bearings, gears, couplings, screws, and related mechanical components. Prerequisite: senior status. (Fall)

192 **Product Design and Process Engineering** (3)

Introduction to product design and to modern manufacturing techniques. Functional, technological, and economic considerations, such as production volume, energy and materials consumption, and labor. Criteria for product acceptance, cost, and other factors. Properties and behavior of metals and polymers. Capabilities and limitations of various basic and secondary processes and their influence on product design. Prerequisite: Senior status. (Spring)

193 **Engineering Systems Design** (3)

Creative engineering design, problem definition, and concept generation. Familiarization with standard machine components. Practice in integrating a variety of core disciplines via system design projects. Visual thinking, graphical communication, analysis and optimization techniques. Creative solutions to current, real engineering design problems. Design projects may integrate with ME 152 Mechanical Engineering Laboratory projects. Prerequisite: ME 191. (Spring)

194 **Energy Conversion** (3)

Energy resources of the earth; energy, society, and the national economy; issue of energy and the environment, future outlook for energy supply and demand. Conversion of energy; fundamental principles and technological options, efficiency of different energy converters. Current technologies and longer-range possibilities. Generation of electricity, trends in the electricity industry; nuclear power systems—growth, economic, and environmental impacts. Unconventional methods of power generation; direct energy conversion. Prerequisite: EE 20, ME 148. (Spring)

198 **Research** (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

ENGINEERING SCIENCE—UNDERGRADUATE COURSE

4 **Descriptive Geometry and Drafting** (3)

Introductory descriptive geometry. Use of equipment. Points, lines, curves, planes, and surfaces; principal, auxiliary, and orthographic views; isometric views, intersection of surface. Technical sketching, dimensions and precision, machine elements. Detail and assembly drawings. Structural elements. Layout and fabrication drawings, pipe and electric prints. (Spring)

GRADUATE STUDY

...ments in science and technology in the decades to come require that ...neer be thoroughly grounded in fundamentals as well as in the newly ... technological and scientific disciplines. The modern engineer must ... techniques in analysis, computation, design, and synthesis. Amidst ...ration of knowledge and technological specialty, the Department ad... principle that versatility and depth in scientific fundamentals should

be the characteristic features of any graduate program that attempts to prep
the student to cope with engineering developments.

The Department of Civil, Mechanical, and Environmental Engineering of
graduate programs in the various areas of concentration on three degree lev
the Master of Science degree, the Professional degree, and the Doctor of Scie
degree.

The Doctor of Science degree is offered in the following areas: Acous
Aeronautics; Energy, Resources, and Environment; Environmental and Wa
Resources (except Option I, Environmental Engineering, which is for
M.S. and Professional degrees only; and Option III, Water Resources Planni
which is for the M.S. degree only); Fluid Mechanics and Thermal Scien
Hydromechanics and Ocean Engineering; Solid Mechanics and Mater
Engineering; Structural Engineering; Structures and Dynamics; and Transpo
tion Engineering (except Option III, which is for the M.S. and Professio
degrees only).

The Master of Science and the Professional degrees are offered in all
the aforementioned areas and in the following areas: Environmental Model
Geotechnical Engineering, Mechanical Engineering Design, and Public Wo
Engineering.

Courses for these specializations are listed on subsequent pages. As part
the interdisciplinary program, students elect approved courses from other
partments of the School of Engineering and Applied Science, as well as fr
other schools and divisions of the University. Depending upon the interest
the student, some of the programs leading to the degrees of Master of Sci
and, by special permission of the appropriate department chairman, Doct
Science are given at the NASA-Langley Research Center, Langley Sta
Hampton, Va. NASA-Langley's extensive scientific and engineering facil
and equipment are utilized whenever feasible.

Each program is arranged to fit the student's individual needs and inter
and utilize previous experience and background. This background shou
normally include an undergraduate degree in engineering, the physical scien
or applied mathematics. Each student is assigned a faculty adviser on
basis of study interests, enabling a close student-faculty relationship to deve
during the course of the program.

Fields and Area of Concentration

Programs of study in any field of concentration will generally include cou
from appropriate allied areas.

ACOUSTICS*

ApSc 211:	Analytical Methods in Engineering I
ApSc 212:	Analytical Methods in Engineering II
ApSc 213:	Analytical Methods in Engineering III
ApSc 215:	Analytical Methods in Engineering V
ApSc 216:	Special Topics in Engineering Analysis
*EngS 203–4:	Probability and Statistics of Metrology
EngS 217:	Analytical Mechanics
EngS 270:	Theoretical Acoustics I

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

ChS 271: Random Process Theory I
ChS 272: Random Process Theory II
ChS 273: Time Series Analysis
ChS 274: Environmental Noise Control
ChS 275: Theoretical Acoustics II
ChS 276: Acoustical and Mechanical Measurements
ChS 277: Physical Acoustics
ChS 278: Psychological and Physiological Acoustics
ChS 279: Human Factors in Engineering
ChS 280: Special Topics in Acoustics
ChS 298: Research
ChS 300: Thesis Research
ChS 310: Aeroacoustics
ChS 311: Nonlinear Acoustics
ChS 312: Theory of Random Vibration
ChS 313: Structural Acoustics Interaction
ChS 398: Advanced Reading and Research
ChS 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 221: Intermediate Fluid Mechanics
ME 312: Theory of Turbulence

AUTICS*

EngSc 211: Analytical Methods in Engineering I
EngSc 212: Analytical Methods in Engineering II
EngSc 213: Analytical Methods in Engineering III
EngSc 214: Analytical Methods in Engineering IV
EngSc 215: Analytical Methods in Engineering V
EngSc 216: Special Topics in Engineering Analysis
EE 202: Linear System Theory I
EngSc 217: Analytical Mechanics
EngSc 284: Numerical Methods in Engineering
ME 215: Theory of Vibrations
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 235: Compressible Flow
ME 237: Energetics of Fluid Flow I
ME 248: Seminar: Aircraft Design I
ME 249: Seminar: Aircraft Design II
ME 270: Aerodynamics of Flight Vehicles
ME 271: VTOL Aircraft Technology
ME 272: Powered-lift Technology
ME 273: Principles of Automatic Flight Control
ME 274: Principles of Flight Guidance
ME 275: Stability and Control of Vehicles
ME 277: Numerical Methods in Fluid Mechanics
ME 278: Performance, Stability, and Control of Helicopters
ME 279: Special Topics in Flight Sciences
ME 281: Nonequilibrium Thermodynamics
ME 290: Kinetic Theory of Gases

* at NASA-Langley Research Center; may be offered on campus when arranged.

ME 295: Statistical Thermodynamics
ME 298: Research
ME 299–300: Thesis Research
ME 312: Theory of Turbulence
ME 315: Hypersonic Flow
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

ENERGY, RESOURCES, AND ENVIRONMENT

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 215: Analytical Methods in Engineering V
CE 243: Environmental Impact Assessment
EAd 221–22: Environmental Management
EAd 283: Systems Engineering I
EngS 206: Technology and Human Needs
EngS 207: Engineering Climatology
EngS 208: Energy Conservation
EngS 210: Quantitative Aspects of Social Phenomena
EngS 212: Nonrenewable Resources
EngS 213: Renewable Resources
EngS 214: Geothermal Energy
EngS 242: Materials Recycling and Recovery
EngS 270: Theoretical Acoustics I
EngS 274: Environmental Noise Control
EngS 284: Numerical Methods in Engineering
ME 204: Advanced Instrumentation Techniques
ME 221: Intermediate Fluid Mechanics
ME 224: Fundamentals of Combustion Engines
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 227: Viscous Flow
ME 235: Compressible Flow
ME 237: Energetics of Fluid Flow I
ME 254: Intermediate Heat and Mass Transfer
ME 257: Energy Technology I
ME 258: Energy Technology II
ME 259: Solar Heating and Cooling Systems
ME 260: Heating, Refrigeration, and Air Conditioning
ME 261: Air Pollution I
ME 262: Air Pollution II
ME 263: Air Pollution Control Technology
ME 264: Air Pollution Seminar
ME 265: Air Pollution Meteorology
ME 280: Intermediate Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 282: Fossil Fuels
ME 283: Nuclear Reactor Engineering I
ME 284: Nuclear Reactor Engineering II
ME 287: Heat Conduction
ME 290: Kinetic Theory of Gases
ME 291–92: Power Systems
ME 293: Combustion
ME 294: Wind Energy

ME 298: Research
-300: Thesis Research
ME 312: Theory of Turbulence
ME 313: Magnetofluidmechanics
ME 398: Advanced Reading and Research
ME 399: Dissertation Research
OR 201: Survey of Operations Research Methods

MENTAL AND WATER RESOURCES ENGINEERING

Option I: Environmental Engineering

CE 213: Analytical Methods in Engineering III
Envr 221: General Biochemistry
CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 211: Physical and Chemical Wastewater Treatment
CE 212: Open Channel Flow
CE 213: Hydraulic Structures
CE 214: Design of Dams
CE 216: Advanced Hydrology
CE 219: Groundwater and Seepage
CE 237: Advanced Sanitary Engineering Design
CE 240: Environmental Microbiology
CE 241: Environmental Chemistry
CE 242: Solid Waste Disposal
CE 243: Environmental Impact Assessment
CE 272: Biological Wastewater Treatment
CE 277: Industrial Waste Treatment
CE 278: Pollution Transport System
CE 281: Special Topics in Water Resources
CE 282: Hydraulic Modeling
CE 298: Research
-300: Thesis Research
CE 310: Sedimentation Engineering
CE 311: Mechanics of Alluvial Channels
Civil 204: Administration of Engineering Contracts
Civil 210: Engineering Law
Civil 261: Economic Analysis in Engineering Planning
Engrs 242: Materials Recycling and Recovery
Engrs 260: Random Process Theory in Engineering
Engrs 284: Numerical Methods in Engineering
ME 221: Intermediate Fluid Mechanics
ME 261: Air Pollution I
ME 262: Air Pollution II
ME 263: Air Pollution Control Technology
Micr 211: Microbiology
UEP 204: Urban Development Planning

...biology and Urban and Regional Planning course descriptions, see the *Undergraduate and*
...bulletin.

Option II: Water Resources Engineering

ApSc 211:	Analytical Methods in Engineering I
ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
ApSc 215:	Analytical Methods in Engineering V
CE 208:	Rock Engineering
CE 212:	Open Channel Flow
CE 213:	Hydraulic Structures
CE 214:	Design of Dams
CE 216:	Advanced Hydrology
CE 219:	Groundwater and Seepage
CE 243:	Environmental Impact Assessment
CE 255:	Coastal Processes
CE 256:	Introduction to Ocean and Coastal Engineering
CE 274:	Mechanics of Water Waves
CE 276:	Water Resources Planning and Control
CE 278:	Pollution Transport System
CE 281:	Special Topics in Water Resources
CE 282:	Hydraulic Modeling
CE 298:	Research
CE 299–300:	Thesis Research
CE 310:	Sedimentation Engineering
CE 311:	Mechanics of Alluvial Channels
CE 312:	Advanced Hydraulics
CE 398:	Advanced Reading and Research
CE 399:	Dissertation Research
EngS 260:	Random Process Theory in Engineering
EngS 284:	Numerical Methods in Engineering
EngS 285:	Finite Element Methods in Engineering Mechanics
ME 221:	Intermediate Fluid Mechanics
ME 227:	Viscous Flow
ME 231:	Hydrodynamics
ME 277:	Numerical Methods in Fluid Mechanics
ME 312:	Theory of Turbulence
OR 251:	Linear Programming
OR 252:	Nonlinear Programming
OR 273:	Digital Systems Simulation

Option III: Water Resources Planning

ApSc 213:	Analytical Methods in Engineering III
CE 212:	Open Channel Flow
CE 213:	Hydraulic Structures
CE 214:	Design of Dams
CE 216:	Advanced Hydrology
CE 242:	Solid Waste Disposal
CE 243:	Environmental Impact Assessment
CE 276:	Water Resources Planning and Control
CE 278:	Pollution Transport System
CE 280:	Water Resources Systems
CE 281:	Special Topics in Water Resources

CE 282: Hydraulic Modeling
CE 298: Research
299–300: Thesis Research
CE 310: Sedimentation Engineering
CE 311: Mechanics of Alluvial Channels
211–12: Engineering Administration
EAd 269: Elements of Decision-making and Problem-solving
EAd 283: Systems Engineering I
EAd 284: Systems Engineering II
EnS 206: Technology and Human Needs
EnS 213: Renewable Resources
EnS 260: Random Process Theory in Engineering
EnS 284: Numerical Methods in Engineering
ME 221: Intermediate Fluid Mechanics
OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 253: Integer, Network, and Dynamic Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 377: Advanced Stochastic Models in Operations Research
217–18: Survey of Economics
Econ 235: Energy Resources and Policy
Econ 237: Seminar: Economics of the Environment and Natural Resources
Geog 222: Seminar: Resources and the Environment
Geog 223: Seminar: The Population-Food Balance
PSc 206: Science, Technology, and Public Affairs

ONMENTAL MODELING†

ApSc 211: Analytical Methods in Engineering I
ApSc 213: Analytical Methods in Engineering III
EnS 263: Atmospheric Physics for Engineers I
EnS 264: Atmospheric Physics for Engineers II
EnS 284: Numerical Methods in Engineering
299–300: Research
EnS 314: Thesis Research
ME 221: Advanced Numerical Methods in Engineering
ME 227: Intermediate Fluid Mechanics
ME 231: Viscous Flow
ME 257: Hydrodynamics
ME 265: Energy Technology I
ME 285: Air-pollution Meteorology
ME 288: Reaction Kinetics
ME 289: Convective Heat and Mass Transfer
ME 296: Radiative Heat Transfer
ME 312: Special Topics in Heat and Mass Transfer
Theory of Turbulence

MECHANICS AND THERMAL SCIENCES

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV

For descriptions, see the *Undergraduate and Graduate Bulletin*.
† At NASA-Langley Research Center; may be offered on campus when arranged.

ApSc 215: Analytical Methods in Engineering V
ApSc 216: Special Topics in Engineering Analysis
CE 274: Mechanics of Water Waves
EE 133: Electromagnetic Waves
EE 236: Plasma Dynamics
EngS 218: Introduction to Continuum Mechanics
EngS 289: Special Topics in Theoretical and Applied Mechanics
EngS 315: Introduction to Nonlinear Mechanics of Continua
ME 218: Design of Floating and Submerged Marine Vehicles
ME 221: Intermediate Fluid Mechanics
ME 222: Applied Fluid Dynamics
ME 223: Aeroelasticity
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 235: Compressible Flow
ME 277: Numerical Methods in Fluid Mechanics
ME 280: Intermediate Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 282: Fossil Fuels
ME 287: Heat Conduction
ME 288: Convective Heat and Mass Transfer
ME 289: Radiative Heat Transfer
ME 295: Statistical Thermodynamics
ME 297: Special Topics in Fluid Mechanics
ME 298: Research
ME 299–300: Thesis Research
ME 310: Mechanics of Non-Newtonian Fluids
ME 311: Nonsteady Flow
ME 312: Theory of Turbulence
ME 313: Magnetofluidmechanics
ME 315: Hypersonic Flow
ME 317: Physical Gas Dynamics
ME 398: Advanced Reading and Research
ME 399: Dissertation Research

GEOTECHNICAL ENGINEERING

ApSc 211: Analytical Methods in Engineering I
ApSc 213: Analytical Methods in Engineering III
CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 207: Soil Dynamics
CE 208: Rock Engineering
CE 209: Theoretical Soil Mechanics
CE 210: Methods of Structural Analysis
CE 212: Open Channel Flow
CE 213: Hydraulic Structures
CE 214: Design of Dams
CE 219: Groundwater and Seepage
CE 221: Pavement and Runway Design
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures

CE 254: Special Topics in Structural Engineering
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 265: Special Topics in Geotechnical Engineering
CE 282: Hydraulic Modeling
CE 298: Research
299–300: Thesis Research
CE 310: Sedimentation Engineering
CE 311: Mechanics of Alluvial Channels
EngS 221: Theory of Elasticity I
EngS 222: Theory of Elasticity II
EngS 256: Introduction to the Theories of Inelastic Media
EngS 284: Numerical Methods in Engineering
EngS 285: Finite Element Methods in Engineering Mechanics
EngS 288: Advanced Finite Element Methods in Structural Mechanics
Geol 128: Geomorphology
Geol 189: Geophysics for Geologists
Geol 224: Advanced Structural Geology

MECHANICS AND OCEAN ENGINEERING

ApSc 211: Analytical Methods in Engineering I
ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
ApSc 215: Analytical Methods in Engineering V
ApSc 216: Special Topics in Engineering Analysis
CE 203: Prestressed Concrete Structures
CE 206: Foundation Engineering
CE 208: Rock Engineering
CE 212: Open Channel Flow
CE 213: Hydraulic Structures
CE 214: Design of Dams
CE 216: Advanced Hydrology
CE 219: Groundwater and Seepage
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 265: Special Topics in Geotechnical Engineering
CE 274: Mechanics of Water Waves
CE 275: Special Topics in Ocean Engineering
CE 282: Hydraulic Modeling
CE 298: Research
299–300: Thesis Research
CE 310: Sedimentation Engineering
CE 311: Mechanics of Alluvial Channels
CE 312: Advanced Hydraulics
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
EngS 228: Physical Oceanography
EngS 260: Random Process Theory in Engineering
Geol 181: General Oceanography
ME 218: Design of Floating and Submerged Marine Vehicles

...ailable course descriptions, see the *Undergraduate and Graduate Bulletin*.

ME 221: Intermediate Fluid Mechanics
ME 227: Viscous Flow
ME 231: Hydrodynamics
ME 277: Numerical Methods in Fluid Mechanics
ME 297: Special Topics in Fluid Mechanics

MECHANICAL ENGINEERING DESIGN (INCLUDING COMPUTER-ORIENT DESIGN)

CE 253: Failure and Reliability Analysis of Engineering Structures
EngS 215: Advanced Strength of Materials
EngS 251–52: Transportation Workshop
EngS 282: Computer-aided Design
EngS 283: Application of Computer Graphics in Engineering
ME 215: Theory of Vibrations
ME 218: Design of Floating and Submerged Marine Vehicles
ME 221: Intermediate Fluid Mechanics
ME 225: Turbomachinery I
ME 226: Turbomachinery II
ME 240: Kinematic Synthesis
ME 241: Engineering Systems Design
ME 243: Advanced Mechanical Engineering Design
ME 246: Electromechanical Control Systems
ME 247: Fluidics
ME 251: Advanced Electromechanical Control Systems
ME 298: Research
ME 299–300: Thesis Research

PUBLIC WORKS ENGINEERING

CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 208: Rock Engineering
CE 211: Physical and Chemical Wastewater Treatment
CE 212: Open Channel Flow
CE 213: Hydraulic Structures
CE 214: Design of Dams
CE 215: Urban Construction Technology
CE 216: Advanced Hydrology
CE 220: Urban Transportation Engineering
CE 221: Pavement and Runway Design
CE 237: Advanced Sanitary Engineering Design
CE 242: Solid Waste Disposal
CE 243: Environmental Impact Assessment
CE 250: Advanced Metal Structures
CE 251: Advanced Reinforced Concrete Structures
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 255: Coastal Processes
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 276: Water Resources Planning and Control

CE 280: Water Resources Systems
CE 281: Special Topics in Water Resources
CE 282: Hydraulic Modeling
CE 310: Sedimentation Engineering
CE 311: Mechanics of Alluvial Channels
EAd 204: Administration of Engineering Contracts
EAd 210: Engineering Law
EAd 241: Construction Management I
EAd 242: Construction Management II
EAd 243: Construction Management III
EAd 261: Economic Analysis in Engineering Planning

MECHANICS AND MATERIALS ENGINEERING

EMSc 211: Analytical Methods in Engineering I
EMSc 212: Analytical Methods in Engineering II
EMSc 213: Analytical Methods in Engineering III
EMSc 214: Analytical Methods in Engineering IV
EMSc 215: Analytical Methods in Engineering V
CE 207: Special Topics in Engineering Analysis
CE 209: Soil Dynamics
CE 252: Theoretical Soil Mechanics
CE 253: General Structural Dynamics
CE 254: Failure and Reliability Analysis of Engineering Structures
CE 261: Special Topics in Structural Engineering
CE 263: Analysis of Plates and Shells
EMeS 215: Theory of Structural Stability
EMeS 217: Advanced Strength of Materials
EMeS 218: Analytical Mechanics
EMeS 221: Introduction to Continuum Mechanics
EMeS 222: Theory of Elasticity I
EMeS 229: Theory of Elasticity II
EMeS 230: Transformations in Materials
EMeS 231: Deformation of Materials
EMeS 233: Structure of Materials
EMeS 234: Mechanics of Composite Materials
EMeS 236: Composite Materials
EMeS 237: Experimental Techniques in Materials Science
EMeS 238: Environmental Effects on Materials I
EMeS 240: Environmental Effects on Materials II
EMeS 241: Fracture Mechanics
EMeS 242: Fatigue and Failure of Materials
EMeS 249: Materials Recycling and Recovery
EMeS 256: Special Topics in Materials Science
EMeS 259: Introduction to the Theories of Inelastic Media
EMeS 284: Random Vibration of Structures
EMeS 285: Numerical Methods in Engineering
EMeS 288: Finite Element Methods in Engineering Mechanics
EMeS 289: Advanced Finite Element Methods in Structural Mechanics
EMeS 298: Special Topics in Theoretical and Applied Mechanics
EMeS 299-300: Research
EMeS 315: Thesis Research
EMeS 398: Introduction to Nonlinear Mechanics of Continua
EMeS 399: Advanced Reading and Research
Dissertation Research

at NASA-Langley Research Center; may be offered on campus when arranged.

ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 221: Intermediate Fluid Mechanics
ME 280: Intermediate Thermodynamics
ME 281: Nonequilibrium Thermodynamics
ME 295: Statistical Thermodynamics
ME 310: Mechanics of Non-Newtonian Fluids

STRUCTURAL ENGINEERING (INCLUDING COMPUTER-ORIENTED ENGINEERING DESIGN)

ApSc 212: Analytical Methods in Engineering II
ApSc 213: Analytical Methods in Engineering III
ApSc 214: Analytical Methods in Engineering IV
CE 201: Design of Metal Structures
CE 202: Design of Reinforced Concrete Structures
CE 203: Prestressed Concrete Structures
CE 204: Applied Soil Mechanics I
CE 205: Applied Soil Mechanics II
CE 206: Foundation Engineering
CE 207: Soil Dynamics
CE 210: Methods of Structural Analysis
CE 215: Urban Construction Technology
CE 250: Advanced Metal Structures
CE 251: Advanced Reinforced Concrete Structures
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 256: Introduction to Ocean and Coastal Engineering
CE 257: Harbor and Coastal Engineering I
CE 258: Harbor and Coastal Engineering II
CE 261: Analysis of Plates and Shells
CE 262: Design of Plate and Shell Structures
CE 263: Theory of Structural Stability
CE 266: Design Procedures for Earthquake, Extreme Wind, and
Natural Hazards I
CE 267: Design Procedures for Earthquake, Extreme Wind, and
Natural Hazards II
CE 298: Research
CE 299–300: Thesis Research
CE 398: Advanced Reading and Research
CE 399: Dissertation Research
EngS 215: Advanced Strength of Materials
EngS 221: Theory of Elasticity I
EngS 233: Mechanics of Composite Materials
EngS 234: Composite Materials
EngS 240: Fracture Mechanics
EngS 241: Fatigue and Failure of Materials
EngS 256: Introduction to the Theories of Inelastic Media
EngS 259: Random Vibration of Structures
EngS 282: Computer-aided Design
EngS 283: Application of Computer Graphics in Engineering
EngS 284: Numerical Methods in Engineering
EngS 285: Finite Element Methods in Engineering Mechanics
EngS 288: Advanced Finite Element Methods in Structural Mechanics

TURES AND DYNAMICS*

AeSc 211: Analytical Methods in Engineering I
AeSc 212: Analytical Methods in Engineering II
AeSc 213: Analytical Methods in Engineering III
AeSc 214: Analytical Methods in Engineering IV
AeSc 215: Analytical Methods in Engineering V
AeSc 216: Special Topics in Engineering Analysis
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 254: Special Topics in Structural Engineering
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EE 157: Machine and Assembly Language Programming
EngS 221: Theory of Elasticity I
EngS 222: Theory of Elasticity II
EngS 234: Composite Materials
EngS 259: Random Vibration of Structures
EngS 281: Advanced Programming Techniques for Engineering Mechanics Problems
EngS 282: Computer-aided Design
EngS 283: Application of Computer Graphics in Engineering
EngS 284: Numerical Methods in Engineering
EngS 285: Finite Element Methods in Engineering Mechanics
EngS 286: Analysis and Design of Thin-walled Structures
EngS 287: Automated Design of Complex Structures
EngS 288: Advanced Finite Element Methods in Structural Mechanics
EngS 289: Special Topics in Theoretical and Applied Mechanics
EngS 299–300: Thesis Research
EngS 314: Advanced Numerical Methods in Engineering
EngS 398: Advanced Reading and Research
EngS 399: Dissertation Research
ME 215: Theory of Vibrations
ME 216: Structural Dynamics
ME 223: Aeroelasticity
ME 248: Seminar: Aircraft Design I
OR 251: Linear Programming
OR 252: Nonlinear Programming

PORTATION ENGINEERING

Option I: Technology of the Vehicle

CE 201: Design of Metal Structures
CE 210: Methods of Structural Analysis
CE 220: Urban Transportation Engineering
CE 252: General Structural Dynamics
CE 253: Failure and Reliability Analysis of Engineering Structures
CE 261: Analysis of Plates and Shells
CE 263: Theory of Structural Stability
EngS 241: Fatigue and Failure of Materials
EngS 251–52: Transportation Workshop
EngS 253: Control of Automated Transit Networks
EngS 259: Random Vibration of Structures
EngS 260: Random Process Theory in Engineering
ME 215: Theory of Vibrations

* At NASA-Langley Research Center; may be offered on campus when arranged.

ME 218:	Design of Floating and Submerged Marine Vehicles
ME 222:	Applied Fluid Dynamics
ME 223:	Aeroelasticity
ME 225:	Turbomachinery I
ME 226:	Turbomachinery II
ME 231:	Hydrodynamics
ME 237:	Energetics of Fluid Flow I
ME 238:	Energetics of Fluid Flow II
ME 241:	Engineering Systems Design
ME 243:	Advanced Mechanical Engineering Design
ME 246:	Electromechanical Control Systems
ME 250:	Design of Complex Systems
ME 251:	Advanced Electromechanical Control Systems
ME 255–56:	Urban Transportation Technology
ME 275:	Stability and Control of Vehicles
ME 286:	Special Topics in Mechanical Engineering
ME 298:	Research
ME 299–300:	Thesis Research
ME 311:	Nonsteady Flow
ME 398:	Advanced Reading and Research
ME 399:	Dissertation Research
*U&RP 208:	Urban Transportation Planning
*U&RP 209:	Urban Transportation Models

Option II: The Way (Route Structures and Facilities)

CE 201:	Design of Metal Structures
CE 202:	Design of Reinforced Concrete Structures
CE 203:	Prestressed Concrete Structures
CE 204:	Applied Soil Mechanics I
CE 205:	Applied Soil Mechanics II
CE 206:	Foundation Engineering
CE 207:	Soil Dynamics
CE 209:	Theoretical Soil Mechanics
CE 210:	Methods of Structural Analysis
CE 220:	Urban Transportation Engineering
CE 221:	Pavement and Runway Design
CE 222:	Stations and Terminals
CE 223:	Traffic Engineering
CE 252:	General Structural Dynamics
CE 253:	Failure and Reliability Analysis of Engineering Structures
CE 256:	Introduction to Ocean and Coastal Engineering
CE 257:	Harbor and Coastal Engineering I
CE 258:	Harbor and Coastal Engineering II
CE 310:	Sedimentation Engineering
CE 311:	Mechanics of Alluvial Channels
EngS 240:	Fracture Mechanics
EngS 241:	Fatigue and Failure of Materials
EngS 251–52:	Transportation Workshop
EngS 253:	Control of Automated Transit Networks
EngS 259:	Random Vibration of Structures
EngS 298:	Research
EngS 299–300:	Thesis Research
EngS 398:	Advanced Reading and Research

* For Urban and Regional Planning course descriptions, see the *Undergraduate and Graduate Bulletin*.

:S 399: Dissertation Research
:S 55–56: Urban Transportation Technology
OR 231: Theory of Traffic Flow
UP 208: Urban Transportation Planning
UP 209: Urban Transportation Models

Option III: Transportation Systems†

:E 220: Urban Transportation Engineering
:E 223: Traffic Engineering
:E 243: Environmental Impact Assessment
:M 261: Economic Analysis in Engineering Planning
:M 265: Transportation Management I
:M 266: Transportation Management II
:S 281–82: Systems Analysis and Management
:S 251–52: Transportation Workshop
:S 253: Control of Automated Transit Networks
:S 255–56: Urban Transportation Technology
:E 298: Research
:S 299–300: Thesis Research
OR 201: Survey of Operations Research Methods I
OR 202: Survey of Operations Research Methods II
OR 231: Theory of Traffic Flow
OR 251: Linear Programming
OR 252: Nonlinear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
UP 201: Introduction to Urban and Regional Planning
UP 208: Urban Transportation Planning
UP 209: Urban Transportation Models

ngineering Graduate Courses

01 **Design of Metal Structures** (3)
Structural behavior of metal structures, conception and design of advanced structural components and systems, hysteretic behavior, plastic design principles, box type girders, cable systems, composite girders, and special topics. Prerequisite: CE 191 or equivalent. (Spring)

02 **Design of Reinforced Concrete Structures** (3)
Structural behavior of reinforced concrete structures, conception and design of structural components, prestressed concrete, slabs, ultimate strength and deformation, box type girders, hysteretic behavior, safety considerations, and special topics. Prerequisite: CE 192 or equivalent. (Fall)

03 **Prestressed Concrete Structures** (3)
Structural behavior and failure modes of prestressed concrete structures; design in prestressed concrete, including long-span structures, bridges, and precast systems. Prerequisite: CE 202 or equivalent. (Spring)

ban and Regional Planning course descriptions, see the *Undergraduate and Graduate*

ective courses for admission to this option are ApSc 115 and Stat 191 (see the *Undergraduate* ineering Bulletin).

204 **Applied Soil Mechanics I** (3)

Theories of soil strength; bearing capacity of shallow foundations their design; deep foundations, including pile types and design crite theories of lateral earth pressure with applications; stability analyses slopes. Selected experiments in the soil mechanics laboratory. Prere site: approval of Department. (Spring)

205 **Applied Soil Mechanics II** (3)

Nature of soil, including geological and pedological aspects; flow water in soil; seepage involving foundations, dams, and wells; stress tribution in earth masses; one- and three-dimensional theories of con dation; analysis of settlement. Selected experiments in the soil mecha laboratory. Prerequisite: approval of Department. (Fall)

206 **Foundation Engineering** (3)

Principles of soil mechanics and structural mechanics applied to analysis and design of spread footings and mat foundations, pile fou tions, retaining structures, including sheeting and bracing systems, waterfront structures. Problems associated with subsurface explorat dewatering excavations, and underpinning. Prerequisite: approval Department. (Spring)

207 **Soil Dynamics** (3)

Stress-strain behavior of soil under transient and repeated loads, effect earthquakes upon foundations and earth dams, design of machinery fo dations. Prerequisite: CE 204. (As arranged)

208 **Rock Engineering** (3)

Classification and properties of rock; nature of rock masses and discontinuities; field exploration; methods of excavation; design applications to foundation slopes, tunnels, and chambers in rock. requisite: approval of Department. (As arranged)

209 **Theoretical Soil Mechanics** (3)

Advanced theories of consolidation. Yield condition in soils. Applicat of theories of plasticity in soil mechanics. Elements of wave propagat in soils, including surface waves. Prerequisite: ApSc 213, and CE or 205. (As arranged)

210 **Methods of Structural Analysis** (3)

Modern methods of analysis of statically indeterminate structures, mo analysis based on flexibility, stiffness, energy and variational methods, structuring techniques; consideration of plastic collapse of structures troduction to the finite element method. Prerequisite: graduate st (Fall)

211 **Physical and Chemical Wastewater Treatment** (3)

Theory and application of physical and chemical operation and proce for wastewater treatment. Topics of discussion will include sedime tion; flotation; disinfection; coagulation; flocculation; filtration; ca adsorption; reverse osmosis; ion exchange and thickening. Prerequis CE 197 or equivalent. (Fall)

212 **Open Channel Flow** (3)

Types and regimes of flow; energy and momentum principles, unifo flow, gradually varied flow, spatially and rapidly varied flow. Flow

non-prismatic channels. Unsteady flow; dam break problem, flood routing. Prerequisite: CE 193 or ME 221. (Fall)

213 **Hydraulic Structures** (3)

Forces on structures and hydraulic design criteria. Design of conveyance, diversion, cross drainage, protective and water measurement structures. Prerequisite: CE 212 or approval of Department. (Summer)

214 **Design of Dams** (3)

Project planning and investigations. Types of dams; design of earth-rock fill dams and concrete gravity dams. Design of outlets, spillways, and appurtenances. Construction methods for dams. Reservoir sedimentation. Safety inspection of dams. Prerequisite: CE 193 or graduate status. (Spring, even years)

215 **Urban Construction Technology** (3)

Precedents and contemporary trends in urban housing, building, and planning technology. Prerequisite: approval of Department. (Spring)

216 **Advanced Hydrology** (3)

Precipitation, evaporation, and transpiration. Soil physics; stream flow, drainage basins, hydrograph analysis, and stream-flow routing. Design criteria, flood frequency statistics and analysis, flood forecasting and control, water supply forecasting. Prerequisite: CE 195 or equivalent. (Spring)

219 **Groundwater and Seepage** (3)

Permeability theory of groundwater flow, flownets, analogs, computer solutions; applications to engineering problems such as excavation dewatering, flow through dams, stabilization of earth slopes. Prerequisite: ApSc 211. (Fall)

220 **Urban Transportation Engineering** (3)

Introduction to urban transportation planning. Analysis of urban transportation requirements. Evaluation procedure for the selection between alternative solutions. Prerequisite: approval of Department. (Fall)

221 **Pavement and Runway Design** (3)

Pavement types, wheel-load characteristics; stresses in pavements and subgrades; empirical methods of design of flexible and rigid highway and airfield pavements; general principles of runway design. Prerequisite: CE 202, and 204 or 205. (Spring)

222 **Stations and Terminals** (3)

Unified treatment of the functions and operation of stations and terminals of transportation systems; emphasis on specifications and planning criteria. Problems of locating the facility, passenger and freight handling, intra-modal and inter-modal interfacing, communication and control. Illustrations include railroad and subway stations, bus terminals, airports, and harbors. Prerequisite: approval of Department. (Spring)

223 **Traffic Engineering** (3)

Roadway traffic capacity and other road network performance measures; methods of characterizing steady and unsteady traffic flow phenomena; traffic behavior monitoring techniques, instruments, and data processing; impact of vehicle and operator dynamics on traffic flow behavior; road bottleneck flow dynamics; traffic control signalization

theory and practical implementation; traffic signal control syst
conventional street networks and limited access expressways; e
of traffic control system implementations. Prerequisite: approval
partment. (Fall)

237 Advanced Sanitary Engineering Design (3)

Basic principles and practical considerations; hydraulic and struct
quirements; basic parameters and elements of design; layout and
of water supply and sewage systems, pumping stations, and was
treatment plants; development of design parameters; cost and fin
existing plant expansions. Prerequisite: graduate status. (Fall)

240 Environmental Microbiology (3)

Basic cellular organizations and processes related to waste trea
microorganisms as disease-carrying agents in natural and waste
laboratory tests for coliform organisms and viruses, and analysis
vated sludge. (Fall)

241 Environmental Chemistry (3)

Chemical composition and chemical analysis of water; chemical tre
of water and waste water; laboratory tests of solids, BOD, COD,
phorus, nitrogen, etc., as related to water quality. (Spring)

242 Solid Waste Disposal (3)

Characteristics of solid waste; collection, transportation, and disposal
tices; regional planning and management; resource and energy rec
from solid waste. Prerequisite: approval of Department. (Fall)

243 Environmental Impact Assessment (3)

Public policy and legislation at federal, state, and local levels conc
quality of the environment. Strategies and methodologies which have
developed to assess impact of engineering projects. Technology of a
ing impact on air and water quality and on land use, applied to tra
tation facilities, water supply and pollution control facilities, and i
trial and community development. Prerequisite: approval of Depart
(Fall)

250 Advanced Metal Structures (3)

Conception, analysis, and design of low-rise and high-rise buildings by
tic and inelastic methods, suspended roofs, earthquake considerations,
unique structural systems. Prerequisite: CE 201 or equivalent.

251 Advanced Reinforced Concrete Structures (3)

Conception, analysis, and design of low-rise and high-rise buildings by
mate strength methods, precast systems, progressive collapse, earthq
considerations, domes, folded plates, shell-type structures and special to
Prerequisite: CE 202 or equivalent. (Spring)

252 General Structural Dynamics (3)

Analysis of single and multiple degree of freedom structural system
der steady-state and transient loads; response of discretized struct
systems, such as rigid frames, plates, and thin shells under dyna
loads, including earthquakes, wind, and blastic loading; introduction
probabilistic methods in structural dynamics. Prerequisite: ApSc
CE 210, or equivalent; and approval of Department. (Spring)

253 Failure and Reliability Analysis of Engineering Structures (3)

Operational and structural failure mechanisms; instability, fracture, and fatigue. Operational and structural safety, probability of failure. Aspects of probabilistic structural analysis, statistics of extremes, risk and reliability, optimal design criteria. Prerequisite: ApSc 115 or equivalent. (Fall)

254 Special Topics in Structural Engineering (3)

Selected problems in structural mechanics and design: (1) thermal stresses in structural systems, (2) advanced probabilistic structural mechanics, (3) structural design for dynamic loads, (4) structural design for repeated loads, or (5) structural synthesis and optimization. May be repeated for credit. Prerequisite: CE 210 and approval of Department. Topic to be announced in the *Schedule of Classes*. (As arranged)

255 Coastal Processes (3)

Longshore currents and nearshore circulation; coastal sediment properties and analysis, longshore transport processes and rates; sediment budget; response of beaches to wave action and structures; tidal inlets, mechanical bypassing; beach nourishment; wind transport of sandy dune stabilization, sediment tracing. Prerequisite: approval of Department. (Spring)

256 Introduction to Ocean and Coastal Engineering (3)

Application of wave mechanics to the analysis of wave motion in coastal and offshore regions: reflection, diffraction, refraction. Wave spectra: procurement of spectral data by direct measurement or from hind-casting techniques. Beaches and littoral drift, mixing processes, outfalls and intakes in the oceans and estuaries, wave forces on coastal and offshore structures, harbor oscillations, tides in estuaries. Prerequisite: ApSc 115, ME 221; or equivalent. (Fall)

257 Harbor and Coastal Engineering I (3)

Waves and swells, tides and currents, coastal regime, estuaries and deltas, structures for coastal protection, principles of harbor navigation, harbor planning and harbor design, breakwaters and sea walls, quays, docks, internal access structures; maintenance of external and internal access, dredging. Prerequisite: CE 256. (Spring)

258 Harbor and Coastal Engineering II (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 252 or equivalent; CE 257. (Fall)

261 Analysis of Plates and Shells (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status. (Spring)

262 Design of Plate and Shell Structures (3)

Design of long-span plate and shell roof structures in reinforced concrete and metal; design of containers for fluids and granular materials; computer applications in the analysis of such structures. Prerequisite: CE 201, 202, 261; or equivalent. (Fall)

263 **Theory of Structural Stability** (3)
General criteria for stability; buckling of elastic and inelastic colum
frames; torsional and lateral buckling; variational methods. Buckl
plates and shells under static loads; stability of stiffened structures;
of imperfections and boundary conditions. Prerequisite: graduate
(Fall)

265 **Special Topics in Geotechnical Engineering** (3)
Selected topics such as rheology of soils, computer applications, e
tion and tunneling, ocean engineering problems, or other special
May be repeated for credit. Prerequisite: approval of Departmen
(As arranged)

266 **Design Procedures for Earthquake, Extreme Wind, and Other Natural Hazards I** (3)
Nature of dynamic loads in problems which arise from earthquake
nadoes, hurricanes, and recurring winds; other natural hazard
such as floods, expansive soils, storm surges, and tsunamis; chara
tics of earthquakes; seismicity, zoning maps, response spectra, wind
acterization, and wind tunnel simulation. Use of probabilistic conc
load determination. Prerequisite: approval of Department.

267 **Design Procedures for Earthquake, Extreme Wind, and Other Natural Hazards II** (3)
Brief review of natural hazard loadings and random formulation;
quake and wind design considerations and procedures; review of co
quirements and specifications; balanced risk approach for natural
cost effectiveness of integrated natural hazard design; special pro
Prerequisite: CE 266 or approval of Department. (Fall)

271 **Theoretical Marine Hydromechanics** (3)
Introductory course designed to acquaint the student with some ph
concepts and mathematical tools of theoretical marine hydromech
Derivation of the fundamental equations and boundary conditions
fluid media; application of potential-flow theory to fluid motion
two- and three-dimensional bodies; perturbation concepts. Introduc
thin-ship and slender-body theories. Derivation of force and moveme
bodies in calm and disturbed water. Prerequisite: approval of Depart
Offered off-campus only. (As arranged)

272 **Biological Wastewater Treatment** (3)
Theory and application of biological methods for wastewater treat
Principles of biological treatment; biological lagoons; trickling filter
vated sludge process; anaerobic and aerobic digestion of sludge. Pre
site: CE 197 or equivalent. (Spring)

274 **Mechanics of Water Waves** (3)
Irrotational theory for deep- and shallow-water waves, reflexion, re
tion, diffraction, attenuation. Water waves of finite amplitude: shal
water theory, tides, bores, long-waves theory, conoidal and solitary w
Wave generation by wind, state-of-the-art based on correlation bet
theory and measurements. Wave-breaking and reflexion. Prerequi
ME 221 or equivalent and permission of instructor. (Fall)

275 **Special Topics in Ocean Engineering** (3)
Selected topics: (1) marine aspects of viscous-flow theory, (2) interfacial (internal) waves, (3) applied random processes in ocean and coastal engineering, or (4) other selected topics. May be repeated for credit. Prerequisite: approval of Department. (Spring)

276 **Water Resources Planning and Control** (3)
The parameters of water resources planning and control; economics of water resources and related natural resources; economics of water quality control; physical parameters of water resource development; water resources law. Prerequisite: approval of Department. (Fall)

277 **Industrial Waste Treatment** (3)
The nature of industry and waste generation; industrial waste characteristics; waste measurements; techniques utilized in industrial waste treatment and control; nuclear waste control; reuse of industrial effluents and sewage for industrial process water; problems associated with treatment and disposal of industrial wastes and their effects on receiving waters. Prerequisite: CE 211 or equivalent. (Fall)

278 **Pollution Transport System** (3)
Distribution of pollutants in natural waters and atmosphere; diffusive and advective transport; mathematics for stream pollutant deoxygeneration rates; groundwater pollution transport; sediment transport; thermal transport; numerical simulation of pollutant transports in streams and estuaries. Prerequisite: CE 193, ME 131. (Fall)

280 **Water Resources Systems** (3)
Water resources planning and control; water quality planning, water supply planning, comprehensive planning and management. Case studies of systems. Prerequisite: CE 276. (Spring)

281 **Special Topics in Water Resources** (3)
Selected Topics: morphometric properties of drainage basins; drainage network analysis; hydraulic geometry of streams; advanced hydraulics of alluvial channels; modeling of drainage basins; computer applications; stochastic hydrology. Prerequisite: approval of Department. (As arranged)

282 **Hydraulic Modeling** (3)
Dimensional analysis and similitude. Types of models; physical models, mathematical models. Distortions in physical models. Erodible bed models. Prerequisite: CE 193 or ME 221 or graduate standing. (Spring, odd years)

298 **Research** (arr.)
Basic research projects, as arranged. May be repeated for credit. (Fall and spring)

300 **Thesis Research** (3–3)
(Fall and spring)

310 **Sedimentation Engineering** (3)
Problems of erosion and sedimentation. Properties of sediment. Initiation of motion. Suspension of sediment and sediment discharge theories. Sedimentation measurements. Economic and legal aspects. Prerequisite: CE 212 or approval of Department. (Fall)

311 Mechanics of Alluvial Channels (3)
Physical processes in drainage basins and channels. Channel forms bed forms. Hydraulics and sediment transport in alluvial channels. sign of stable channels. Qualitative and quantitative response of Channel stabilization, navigation channels. Case studies includi vironmental impacts. Prerequisite: CE 212 or approval of Depart (Spring)

312 Advanced Hydraulics (3)
Continuity, energy, and momentum equations. Turbulence, diffusion dispersion. Cavitation, waves, subsurface flow. Special problems i through hydraulic and marine structures. (Summer)

398 Advanced Reading and Research (arr.)
Limited to students preparing for the Doctor of Science qualifying nation. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)
Limited to Doctor of Science candidates. May be repeated for cred (Fall and spring)

Mechanical Engineering Graduate Courses

204 Advanced Instrumentation Techniques (3)
Pressure and temperature sensors; shadowgraph, schlieren and inte meter systems; laser holography; laser doppler velocimetry; signal tioning, use of amplifiers with shielding and grounding techniques techniques; signal multiplexing; use of computers; error analysis and handling. Lecture and laboratory. Prerequisite: approval of Depart (Fall)

215 Theory of Vibrations (3)
Damped and undamped natural vibrations, transient response and res to harmonic and periodic excitation, natural vibration of discrete continuous systems; integral formulation of eigenvalue problems, res by modal analysis, approximate methods, influence of secondary and constraints, damped systems. Prerequisite: approval of Depart (Fall)

216 Structural Dynamics (3)
Methods of solving vibration problems: differential equation, Ray Ritz finite element. Free and forced vibration of structural compon straight, curved, and thin-walled beams; plates and shells; sandwich struction. Vibration of built-up structures. Structural wave motion, motion in periodic structures. Prerequisite: ME 215. (As arrange

218 Design of Floating and Submerged Marine Vehicles (3)
Consideration of interaction between hydrodynamics, propulsion, and figuration aspects of design of floating structures and vehicles; effec submergence and deep submergence; hydrofoil and vertical jet a structural considerations. Prerequisite: EngS 228. (Fall)

221 Intermediate Fluid Mechanics (3)
The continuum, kinematics of fluids; stress tensor, strain and rate-of-s tensor; fundamental equations of the flow of viscous compressible fl

Laplace's equations; source, sink, and doublet; vortices, Biot-Savart theorem and the flow field of a vortex; spherical and cylindrical harmonics; methods of singularity distributions, complex-variable methods; laminar flow of viscous incompressible fluids; boundary-layer concept. Prerequisite: approval of Department. (Fall)

222 **Applied Fluid Dynamics** (3)

Subsonic lifting line wing theory, direct and inverse solution of the lifting surface theory; singularity method for wing-body combination; vortex lift theory; effects of camber and twist distribution; transonic airfoils, effect of wing sweep, area ruling concept; supersonic linearized wing theory; similarity rules. Prerequisite: ME 221 or equivalent. (Spring)

223 **Aeroelasticity** (3)

Introduction to aeroelastic phenomena; structural deformations of vehicles under static and dynamic loads; vibrations of vehicle structures; static aeroelastic problems (structural deformation, divergence, control effectiveness, and reversal); flutter theory and calculation of flutter boundaries; aerodynamics of steady and nonsteady two-dimensional wings in subsonic, sonic, and supersonic flow; strip theory applications of two-dimensional aerodynamics to three-dimensional lifting surfaces; piston theory and Newtonian-flow theory. Prerequisite: ME 215, 221; or equivalent. (Fall)

224 **Fundamentals of Combustion Engines** (3)

Classification of combustion engines: air cycles, vapor cycles, external combustion engines, internal combustion engines; rotary engines, reciprocating engines, and turbomachinery; ideal cycle analysis; engine heat losses and friction; practical cycle analysis status of computerized cycle analysis; combustion and knocking; carburetion and fuel injection; mixture distribution; valve mechanism; ignition systems; combustion chamber; piston-engine, rotary-engine, and turbomachinery mechanics and balance. Prerequisite: approval of Department. (Fall)

225 **Turbomachinery I** (3)

Turbine, compressor, and pump types and uses; dimensional analysis of turbomachines; cycle analysis of gas and steam turbines; energy interchange in fluid machinery; design, characteristics, and performance of turbines, compressors, and pumps; comparison of types of turbines, compressors, and pumps. Prerequisite: ME 221. (Fall)

226 **Turbomachinery II** (3)

Aerodynamics of aerofoils, flow in cascades, axial compressor aerodynamic design, axial turbine aerodynamic design, compressor and turbine matching. Combustion fundamentals, combustion chemistry, and gas turbine combustion chamber design. Prerequisite: ME 225. (Spring)

227 **Viscous Flow** (3)

Exact solutions of Navier-Stokes equations; the small Reynolds number approximations, laminar boundary-layer theory and the techniques for its solution, stability of laminar flows; Reynolds theory of turbulent stresses, applications to internal and external flows, turbulent boundary-layer theory; applications to heat transfer problems; flow separation. Prerequisite: AnSc 213; and ME 221 or equivalent. (Fall)

231 Hydrodynamics (3)

Flow at large Reynolds number: vorticity dynamics, Kelvin's theore inviscid flow, vorticity in motions generated from rest, boundary l applications of the momentum theorem. Irrotational flow theory: cations of Bernoulli and momentum theorems to steady flows, flow a rigid body, two-dimensional motion and applications of complex va theory, free surface flows, Froude numbers, criterion of dynamic si ity. Effectively inviscid flow with vorticity: sheet vortex, flow with vortex system of a wing. Prerequisite: ME 221 or equivalent. (S

235 Compressible Flow (3)

Thermodynamics and physical properties of gases, fundamental equ of a compressible inviscid fluid, small perturbation theory, expansio Mach number and thickness parameters, second-order shock shape of entropy in supersonic flow, shock wave interactions, holograph formation, Kármán-Tsien and other model gases, conical flows, tra flow theory, method of characteristics, rotational nonisentropic flows. requisite: ApSc 213; and ME 221 or equivalent. (Spring)

237 Energetics of Fluid Flow I (3)

(Formerly Propulsion I)

Energy transformations in fluid flows. Gas dynamics of combustion. uniform flow, mixing. Mechanisms of flow induction. Applicatio pumping, propulsion in water, air, and space, and thrust augmen Prerequisite: ME 155 or equivalent. (Fall)

238 Energetics of Fluid Flow II (3)

(Formerly Propulsion II)

Wave processes and their utilization. Static, dynamic, and cryoge pressure exchange; energy equalizers and dividers. Advanced conce air and marine propulsion. Discussion of various concepts of flow i tion, thrust generation, and environmental control. Prerequisite: M or equivalent. (Spring)

240 Kinematic Synthesis (3)

Techniques for the analysis and synthesis of function, path, and m generating mechanisms. Algebraic and graphical methods for the d sional design of mechanisms having prescribed performance cha istics. Design for higher-order requirements. Computer-aided tech for the optimal design of planar linkages using Burmester theory, co plex number stretch-rotation operators, Chebyshev polynomials, etc cussion of spatial mechanisms analysis and design using matrix tensor methods, dual angles, dual vectors, quaternion algebra, and quaternions if time permits. Review of recent developments and rent research. Term project.

241 Engineering Systems Design (3)

Principles of systems design; interdisciplinary system simulation fo chanical, electrical, fluid, and thermal sciences; dynamic response of tems; mathematical model and analogy studies; optimization techn with computer-aided solutions. Prerequisite: approval of Departme (Spring)

243 Advanced Mechanical Engineering Design (3)

Reduction of physical and engineering systems to simplified phy and mathematical models; representation using networks, linear gr

reticular geometry and finite element methods. Optimization techniques. Manipulation of the resulting models using digital algorithms. Examples drawn from fields primarily of interest to scientists and engineers, with some attention to styles of problem solving. Elements of automatic computation with emphasis on applications using FORTRAN as a programming language. Working knowledge of FORTRAN recommended.

246 **Electromechanical Control Systems** (3)

System synthesis, compensation, and stabilization using Bode diagrams, root locus, etc.; linear and nonlinear characterization of mechanical, electromechanical, and electronic control components. Prerequisite: approval of Department. (Fall)

247 **Fluidics** (3)

Introduction of fluidic components and systems: behavior and modeling of bistable and proportional jet devices, vortex amplifiers and sensors, passive elements, transmission lines; system synthesis, coupling effects. Survey of current applications and research. Prerequisite: approval of Department. (Spring)

248 **Seminar: Aircraft Design I** (3)

Designing an aircraft to specifications. Regulatory requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of Department. (As arranged)

249 **Seminar: Aircraft Design II** (3)

Aircraft design in relation to prescribed mission requirements, different configurative concepts, detail design features. Estimation of weight, size, and power of an aircraft to satisfy mission specifications; design trade-offs and compromises. Emphasis on subsonic aircraft for steady cruising flight missions. Jet-powered and propeller-driven aircraft; supersonic cruising aircraft. Prerequisite: approval of Department. (Spring)

251 **Advanced Electromechanical Control Systems** (3)

Time domain analysis and design of electromechanical control systems using state space methods and matrix differential equation techniques. Advanced stability analysis and design optimization techniques for both linear and nonlinear systems. Examples taken from practical mechanical components and systems including continuous and discrete time systems. Introduction to electromechanical switching system theory and practice. Prerequisite: ME 246. (As arranged)

254 **Intermediate Heat and Mass Transfer** (3)

Fundamentals of heat and mass transfer, its laws and properties. Conduction equations and solutions for steady and transient cases. Convection of heat and mass. Dimensionless numbers and boundary layer concepts. Laminar, transition, and turbulent flows. Radiation in transparent media and at surfaces. Application to combustors and solar devices. Prerequisite: ApSc 213. (Fall)

258 **Urban Transportation Technology** (3)

An introduction to the technical evaluation of alternative transportation modes including bus, rail, and new technology. Includes system operations, energy and environmental impacts, route constraints, suspension

NASA-Langley Research Center; may be offered on campus when arranged.

and switching systems, life cycle costs, and measures of system
tiveness. Prerequisite: approval of Department. (Fall)

257 **Energy Technology I**

An overall view of energy technology, supply and demand, and th
lation among energy, environment, and institutional problems. Re
sion analysis, forecasting of supply and demand, energy systems m
ing, analysis of cycles, Second Law analysis, nuclear energy, and e
transmission. Prerequisite: approval of Department. (Fall)

258 **Energy Technology II**

Continuation of ME 257. Various forms of solar energy (e.g., he
and cooling, photovoltaics, wind, biomass, ocean thermal gradients),
energy, geothermal energy, energy and food production, energy sy
design, and energy policy. Prerequisite: ME 257. (Spring)

259 **Solar Heating and Cooling Systems (3)**

Availability of solar energy, climatic data for solar heating and coo
System description, solar collector, thermal energy storage, auxiliar
ergy source; system performance requirements. Subsystems evalua
collector performance analysis, collector fluid loop optimization, the
energy storage requirements. System configurations and modeling, co
system requirements. Estimation of the total life-cycle costs for sol
solar heating and cooling systems. Architectural features and const
tions. Prerequisite: approval of Department. (Fall)

260 **Heating, Refrigeration, and Air Conditioning (3)**

Theoretical considerations and engineering data including psychrom
and physiological principles. Load calculations, computer programs fo
sign and for energy analysis. Air conditioning and heating systems:
air, air and water, all-water systems; heat recovery and heat pump
tems, central control systems. Cost estimate and economic analysis,
cycle costing. Codes and standards. Prerequisite: approval of De
ment. (Spring)

261 **Air Pollution I (3)**

(Formerly Fundamentals of Environmental Control I)

An introductory course on the generation, monitoring, and control o
pollution. Elements of the system: generation of particulate and ga
pollutants in natural, industrial, and energy-generating systems;
transformation as they diffuse into the dynamic sun-irradiated atmos
assessment of their impact through monitoring and inventory of e
sions sources. Effects on health and welfare on urban, regional,
global scales. Air pollution standard setting and control strategy d
opment. Prerequisite: approval of Department. (Fall)

262 **Air Pollution II (3)**

(Formerly Fundamentals of Environmental Control II)

Laboratory and field survey and assessment of air pollution probl
A variety of laboratory techniques will be used to measure actual am
air quality, and laboratory and field sampling of pollutant levels inside
immediately outside combustion systems will be conducted. Diffusion
chemical models will be used to relate sources and sensors of air p
tion. A field air pollution impact assessment project will culminate
course activity. Prerequisite: ME 261 or equivalent. (Spring)

Air Pollution Control Technology (3)
(Formerly Environmental Control Processes I)
Theoretical and applied aspects of aerosol and gaseous emission control from both stationary and mobile sources. Aerosol controls: sedimentation, precipitation, filtration, and wet collection. Application of scrubbers, catalysts, and combustion modification to control of gaseous emissions from stationary sources. Special techniques for fine particulate control (fabric, electrostatics). Control of automotive emissions through engine modification, catalysts, and alternative power systems. Vapors, odors, and noise. Prerequisite: ME 261 or equivalent. (Spring)

Air Pollution Seminar (3)
(Formerly Environmental Control Processes II)
Special interest and advanced topics not covered in ME 261, 262, or 263. Special lectures by individual experts. Participants will be required to conduct a special topic study for contribution to the seminar. Prerequisite: approval of Department. (Fall)

Air Pollution Meteorology (3)
Weather and motion systems of atmosphere; ground- and upper-level air conditions; atmospheric stability and inversions; atmospheric turbulence and diffusion; urban and topographic effects upon meteorological parameters; effects of meteorological parameters upon transportation and diffusion of pollutants; meteorological factors in plant location, design, and operation, and in urban planning. Prerequisite: ME 221 or equivalent. (Fall)

Aerodynamics of Flight Vehicles (3)
Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent. (Spring)

VTOL Aircraft Technology (3)
Fundamental principles of VTOL aircraft; hovering performance based on momentum theory; analysis of jet-induced interference effects; transition aerodynamics; theoretical stability and control and correlation with flight data; ground-effect theory and experiment; handling qualities criteria; elements of instrument approach and landing problem. Prerequisite: approval of Department. (Spring)

Powered-Lift Technology (3)
(Formerly STOL Aircraft Technology)
Basic principles of powered-lift aircraft; high-lift aerodynamics; low-speed stability and control; fundamentals of internally blown and externally blown powered-lift concepts; the spanwise blowing scheme to delay wing stall; use of powered-lift for improved maneuverability of fighter aircraft; aerodynamic ground effects; alleviation of noise of powered-lift systems; aerodynamic loads associated with blown flaps. Prerequisite: approval of Department. (Fall)

Principles of Automatic Flight Control (3)
Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control; stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of Department. (Fall)

NASA-Langley Research Center; may be offered on campus when arranged.

*274 **Principles of Flight Guidance** (3)
Guidance requirements for atmospheric flight; implementation of guid
systems using inertial and radio techniques in conjunction with autom
data processing. Prerequisite: ME 273. (Fall)

275 **Stability and Control of Vehicles** (3)
Derivation of equations of motion, Euler transformations and direc
cosines, stability derivatives and linearization of equations of motion.
bility of linear systems with application to longitudinal and lateral dy
ics, Laplace transform techniques, and frequency response analysis.
requisite: approval of Department. (As arranged)

*276 **Mechanics of Space Flight** (3)
First- and second-order Hamilton-Jacobi perturbation theory applie
artificial satellites, von Zeipel's methods, special and general perturb
theories for third-body perturbations. Differential correction of orbi
weighted least squares and minimum variance techniques. Compar
of various filtering techniques as applied to orbit determination and
space flight parameter estimation. Prerequisite: approval of Departm
(As arranged)

277 **Numerical Methods in Fluid Mechanics** (3)
Numerical solution of partial differential equations of fluid flow; f
difference techniques for viscous and inviscid flows; stability; method
characteristics; boundary conditions; applications in subsonic and s
sonic flows. Prerequisite: ApSc 213, EngS 284; or equivalent. (As
ranged)

*278 **Performance, Stability, and Control of Helicopters** (3)
Development of rotor blade theories; actuator disc, blade element, v
theory. Hovering and climb performance, autorotation and forward f
performance. Rotor system mechanics, flapping motion of articulated
semi-rigid rotors, blade motions in plane of rotation. General perfo
ance and design considerations. Stability and control in hovering
forward flight, damping in pitch and roll, static stability with speed
angle of attack. Prerequisite: ME 222, 275. (Spring)

*279 **Special Topics in Flight Sciences** (3)
Current problems and methods in high angle of attack stability and
trol. Nonlinear aerodynamics in the angle of attack region above
stall. Influence of aircraft design and nonlinear aerodynamics parame
on the poststall stability and control of aircraft. Employment of co
experimental techniques and development of equations pertaining to
veloped spin and recovery characteristics. Prerequisite: ME 275 or
proval of Department. (Spring)

280 **Intermediate Thermodynamics** (3)
(Formerly Advanced Thermodynamics)
Thermodynamic systems; Gibbs equations; potentials, thermodynamic
lationships, equilibrium and stability. Statistical thermodynamics; p
ability and macrostates; properties of perfect gases, mixtures, and cry
Elements of kinetic theory and its application to transport prope
Introduction to relativistic thermodynamics. Application to chemical
actions, thermal radiation, magnetic, electric, and solid systems. Prere
site: approval of Department. (Fall)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

391 Nonequilibrium Thermodynamics (3)

Molecular theories of gases; thermodynamic properties and Boltzmann's integro-differential equation, the H-theorem and entropy; equations of state and potentials; the equation of change and velocity distribution outside equilibrium; transport properties. Field theory. Constitutive, balance, and Gibbs equations. Variational principles. Application to transport processes in engineering systems. Prerequisite: ME 280. (Spring)

392 Fossil Fuels (3)

Coal, petroleum, and natural gas. Fossil fuel reserves, methodologies of estimating and exploring for fossil fuels. Geophysical, geochemical, and satellite techniques. Prerequisite: Chem 152. (As arranged)

393 Nuclear Reactor Engineering I (3)

World energy resources and the importance of fission energy; atomic and nuclear structure; nuclear fission and chain reaction; critical mass; nuclear reactor classification; history of reactor development; nuclear reactions and radiations; radioactive decay; radiation detection, hazards, and protection; neutron reactions; neutron diffusion and slowing down; the criticality condition; reflected reactors; homogeneous and heterogeneous reactor systems; transient reactor behavior and control; description of pressurized and boiling water reactors; other reactor systems. Environmental considerations; reactor safety. Prerequisite: approval of Department. (Fall)

394 Nuclear Reactor Engineering II (3)

Energy removal; reactor coolants; reactor thermal hydraulics, radiation damage and reactor materials problems; reactor fuels; shielding; mechanical and structural components; preliminary reactor design; fuel cycles; description of nuclear reactor systems; engineered safety systems; the economics of nuclear power. Prerequisite: ME 283. (Spring)

395 Reaction Kinetics (3)

Theoretical aspects of kinetics of homogeneous and heterogenous reactions in gaseous and liquid systems. Prerequisite: ME 280. (Spring)

396 Special Topics in Mechanical Engineering (3)

Prerequisite: approval of Department. (As arranged)

397 Heat Conduction (3)

Conduction of heat through solid, liquid, and gaseous media; formulation and methods of analytical, numerical, and analog solutions; steady two- and three-dimensional problems, problems in unsteady heat conduction; conduction in composite regions. Prerequisite: ApSc 213 or equivalent. (Fall)

398 Convective Heat and Mass Transfer (3)

Heat and momentum transfer in laminar and turbulent flow; application of boundary-layer theory to problems of forced convection; the laminar boundary-layer and similarity solutions; heat convection in turbulent flow, momentum-heat transfer analogy; the influence of temperature-dependent fluid properties; convective heat transfer at high velocities; mass transfer; formulation of a simplified theory; some solutions to the conserved property equation. Prerequisite: ME 221 or equivalent. (Spring)

[a] NASA-Langley Research Center; may be offered on campus when arranged.

289 Radiative Heat Transfer (3)

Nature of thermal radiation; radiative characteristics of surfaces; th
radiation within evacuated enclosures; configuration factors algebra;
tion methods for the integral equations of radiant interchange; enclo
containing an absorbing and emitting medium; absorbing, emitting
scattering media; combined radiation, conduction, and convection.
requisite: ApSc 214 or equivalent. (Fall)

***290 Kinetic Theory of Gases (3)**

Equation of state and physical properties for gas composed of discret
ticles; relation of kinetic theory to thermodynamics; Maxwell distrib
of molecular velocities; Boltzmann H theorem. Molecular interac
free paths, collision rates, scattering coefficients. Introduction to diff
viscosity, heat conduction; imperfect gases; flow of gases at low de
Prerequisite: ME 280. (Spring)

291–92 Power Systems (3–3)

Design of thermal power system components and system optimiz
Steam cycle power generation system components: steam generato
actor coolant system, condensate and feedwater system, turbine-gene
waste heat removal. Heat balance studies, options for improved cycl
ciencies, system optimization studies, component selection and d
cooling towers, lakes and ponds. Review of safety and pollution re
tions; testing, inspection, and codes. Survey of electric power system
nology. Prerequisite: ME 148, 187; or equivalent. (Academic ye

293 Combustion (3)

Basic combustion phenomena. Rate processes and chemical kin
Chain reaction theory. Detonation, deflagration, diffusion flames, h
geneous combustion. Combustion technology, computer modeling
experimental measurements. Impact of pollution regulations and alt
fuels. Prerequisite: approval of Department. (Spring)

294 Wind Energy (3)

Technical and economic problems of energy extractions from wind
amination of the morphology of conversion devices; energy extra
from a moving fluid stream; aerodynamics of rotors. Nature of the
its special, temporal, and terrain-dependent variables. Structural, dyn
and electrical problems and requirements; systems tradeoffs in wind
bine design. A wind turbine will be designed. Prerequisite: approv
Department. (Fall)

295 Statistical Thermodynamics (3)

Distribution functions; Boltzmann, Bose-Einstein, and Fermi-Dirac
tistics; partition functions, correspondence between classical and stat
thermodynamics. Systems with negligible effects of interparticle f
perfect gases, perfect electron gas, photon gas. The Debye solid
Einstein solid. Prerequisite: ME 280. (Spring)

296 Special Topics in Heat and Mass Transfer (3)

Prerequisite: approval of Department. (As arranged)

297 Special Topics in Fluid Mechanics (3)

Prerequisite: approval of Department. (As arranged)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Research (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

Thesis Research (3–3)

(Fall and spring)

Mechanics of Non-Newtonian Fluids (3)

Classification of fluids; physical properties of composite fluids; convected coordinate systems; fundamentals of constitutive equations of composite fluids; purely viscous fluids, Reiner and Rivlin theories, power-law fluids; linear theory of viscoelastic fluids, Boltzmann principle, quasi-linear viscol elasticity; nonlinear theory of viscoelasticity, Rivlin-Ericksen theory; viscoplastic fluids, Bingham plastic fluids, Oldroyd's analysis; viscometry and rheogoneometry; turbulent flow of suspensions and emulsions in pipes; frictional drag reduction by polymeric additives. Prerequisite: approval of Department. (Fall)

Nonsteady Flow (3)

Eulerian and Lagrangian kinematics. Fundamental equations of nonsteady viscous flow. Characteristics and waves; initial and boundary conditions. Piston theory and the oscillating airfoil. Nonsteady flows with entropy production. Discontinuities, interactions, and special transients. Gasdynamics of nonsteady combustion. Analogies and applications. Prerequisite: ME 235 or ME 237 or equivalent. (Fall)

Theory of Turbulence (3)

Concept of turbulence, transition and linear theory of flow stability, experimental observations on turbulence generation, turbulent kinetic energy distribution, statistical description of turbulence, energy cascade and energy spectrum in turbulence, mean turbulent energy and Reynolds stress closure models, turbulent shear flows in free turbulence and wall turbulence, turbulence in atmospherical environment and effects on air-pollution and weather systems, turbulent drag reduction. Prerequisite: ME 227. (Fall)

Magnetofluidmechanics (3)

Thermodynamics and fluid mechanics of electrically conducting liquids and gases; theory and applications; thermodynamics and transport properties of plasmas formulated; reaction kinetics and plasma reactions; fundamental equations (mass, momentum, and energy) of magnetofluidmechanics; flow with infinite and finite conductivity. Alfven waves and wave phenomena, flow with heat transfer and friction, relativistic magnetofluidmechanics, dimensional analysis and scaling parameters, applications to MHD power generators, pumps, plasma jets and propulsion, controlled thermonuclear fusion, chemical synthesis and mineral separation. Prerequisite: ME 221 and ME 280. (As arranged)

Hypersonic Flow (3)

Small-disturbance theory, Newtonian theory; constant-density solution, theory of thin shock layers, flow over blunt bodies, hypersonic viscous flow. Prerequisite: ME 227. (Fall)

Physical Gas Dynamics (3)

Molecular and atomic phenomena in gases, intermolecular forces, specific heats, equation of state for a real gas, dynamics of dissociating gas, radiation. Prerequisite: ME 235; and ME 295 or equivalent. (Spring)

398 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying e
nation. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit
(Fall and spring)

Engineering Science Graduate Courses

201 **History of Technology I** (3)
The characteristic technologies of Prehistory, the Ancient Near
Greece and Rome, Byzantium and Islam, and Christian Europe.
nology is broadly defined. Emphasis is on its manifold interactions
other cultural forces. (Fall)

*202 **Advanced General Metrology** (3)
Topics in the conceptual, physical, and mathematical aspects of me
ment, standards, design for precision measurement, and measurem
extreme values. Prerequisite: graduate status. (Fall—evening)

*203–4 **Probability and Statistics of Metrology** (3–3)
Probability distributions, discrete and continuous distributions; sam
combinatorial analysis; stochastic processes; conditional probability
relation; analysis of variance; design and analysis of experiments;
Square experiments; factorial experiments; block and lattice design
requisite: ApSc 115 or equivalent. (Academic year—evening)

206 **Technology and Human Needs** (3)
Sociology of science and technology, the solar systems and earth. P
tion, nonrenewable resources, renewable resources, energy, nuclea
ergy, renewable energy conversion, environment, productivity, trans
tion. Prerequisite: approval of Department. (Fall and spring)

207 **Engineering Climatology** (3)
Constitution of physical properties of earth and atmosphere, stability
ditions, energy balance characteristics, atmospheric motions, storm
casting models, tree-ring analysis, evaporation, precipitation, fog &
tion, soil moisture, ground frost. Prerequisite: approval of Depart
(As arranged)

208 **Energy Conservation** (3)
Methods of conserving energy without sacrificing productivity an
quality of life. Conservation methods in the home, in transportati
industrial, manufacturing, and commercial sectors. Second law of
modynamics from a conservation viewpoint. Construction metho
low-energy consumption in large and small edifices. Environmental
and low-fuel consumption in ground and air transportation. Greenh
and natural fertilizers. Prerequisite: approval of Department.
ranged)

210 **Quantitative Aspects of Social Phenomena** (3)
Mathematical models presenting social phenomena. Historical revi
attempts to quantify social phenomena. Population growth, birth
death rates; population diffusion; Lancaster equation; Richardson
proach; the Forrester-Meadows model. Kinetic theory formulation

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

peaceful co-existence. Probability distributions, characteristic functions, and central limit theorem. Brownian motion approach to speculation and the stock market. Traffic flow, the statistical approach and Lighthill's method. Quality-of-life indicators and quantification of social indicators. Environmental modeling. Thermodynamics approach to self-rejuvenating systems and its application in government and organizations. Prerequisite: approval of Department. (As arranged)

Nonrenewable Resources (3)
Interplay of geology, engineering, and economics on resources. Role of resources in society, concepts and definitions for analyzing resource issues. Mineral commodities, their world distribution, geology, production technologies and costs, transportation systems, consumption patterns, substitutes, recycling. Environmental impacts, energy requirements, needs, and problems in mineral conservation; the threat of mineral cartels. Analysis of optimistic and pessimistic forecasts of future resource depletion. Prerequisite: approval of Department. (As arranged)

Renewable Resources (3)
Food and fiber, solar energy and radiation, photosynthesis. Agricultural and forest biomass production, seasonal availability, collection and replanting. Substitution of renewable resources for depletable. Food-energy relationship. Biological and chemical conversion processes, direct combustion, pyrolysis, enzymatic hydrolysis, and hydrogenation. Economics of scale and life cycle cost of conversion systems. Environmental and socio-economic impacts of alternative land usage. Institutional barriers. Prerequisite: approval of Department. (As arranged)

Geothermal Energy (3)
Geothermal energy due to thermal gradients in the earth, fundamentals of geological gradients, geographic location of potential geothermal energy sources, comparison of methods of exploration and study of steam and hot rock systems. Generation of electricity from geothermal sources. Obtaining hot water process heat. Equipment design. Environmental effects and means of mitigating adverse conditions. Prerequisite: approval of Department. (As arranged)

Advanced Strength of Materials (3)
Advanced problems of stress and strength analysis of structural and machine elements: bending, torsion and buckling of thin-walled structures. Curved beams, stress-concentrations, thermal stresses, creep instability and stress relaxation, contact problems, composite elements. Prerequisite: approval of Department. (Spring)

Analytical Mechanics (3)
Fundamental principles, generalized coordinates, variational principles and Lagrange's equations, nonholonomic systems, Hamilton's equations, theory of small oscillations. Prerequisite: approval of Department. (Fall)

Introduction to Continuum Mechanics (3)
Kinematics of a continuum, equations of motion, linear isotropic elastic solid, Newtonian viscous fluid, integral formulation of general principles, simple applications. Prerequisite: approval of Department. (Fall)

Theory of Elasticity I (3)
Introduction to Cartesian tensor analysis; deformation, stress, linear constitutive relations, formulation of boundary value problems, variational principles; torsion and bending of prismatical rods, plane problems in elastostatics. Prerequisite: approval of Department. (Fall)

222 Theory of Elasticity II (3)

Application of integral transforms and analytic function theory to so
of plane problems in static and dynamic elasticity. Introduction to
dimensional elastostatics. Prerequisite: EngS 221, ApSc 211. (Sp

228 Physical Oceanography (3)

Seawater, equations of motion, interaction between air and sea, cu
wind-waves in deep and shallow waters, long ocean waves, tides,
statistics, sea ice. Prerequisite: ME 221 or equivalent. (Spring)

229 Transformations in Materials (3)

Thermodynamics of solids, statistical interpretation of entropy, latti
fects, equilibrium in multicomponent systems, rate theory, diffusion,
transformations, nucleation and growth, precipitation, martensitic
formations. Prerequisite: approval of Department. (Spring, odd

230 Deformation of Materials (3)

Dislocation geometry, stress field of dislocations, forces on a disloc
dislocation reactions, dislocation dynamics, yield, plastic flow, work
ening, recovery, solid solution hardening, precipitation and disp
hardening, mechanisms of creep, yield, and fracture. Prerequisite: ap
of Department. (Fall, odd years)

231 Structure of Materials (3)

Space lattices, crystal structures, planes, directions, anisotropy,
and preferred orientations, stereographic projections, Bragg's law,
techniques, moving crystal diffraction, Debye-Scherrer method,
spectrometry, electron microscopy, bonding energy of crystals, latti
ergy, lattice vibrations, free electron theory, zone theory, alloy the
conductors, insulators and semiconductors, magnetism, resistivity,
in metals. Prerequisite: approval of Department. (Fall, even ye

233 Mechanics of Composite Materials (3)

Stress-strain relationship for orthotropic materials; invariant prop
of an orthotropic lamina; biaxial strength theory for an orthotrop
mina; mechanics of materials approach to stiffness; elasticity app
to stiffness; classical lamination theory; strength of laminates; sti
theory of fatigue damage for composites. Prerequisite: approval
partment. (Spring)

234 Composite Materials (3)

Principles of composites and composite reinforcement; micromec
and failure; interface reactions in various composites; reinforcing
rials; structure of composites—fiber-reinforced polymers, filler-rein
polymers, fiber-reinforced metals, directionally solidified alloys, disp
strengthened metals. Prerequisite: approval of Department. (S

***236 Experimental Techniques in Materials Science (3)**

Sample preparation. Optical microscopy including polarized light me
phase contrast, interferometry. X-ray microscopy including Laue
nique and Debye-Scherrer method. Electron probe microanalysis.
tron microscopy including electron optics, image formation and co
for scanning and transmission electron microscopy. Field ion micros
Prerequisite: approval of Department. (As arranged)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

Environmental Effects on Materials I (3)

Aqueous corrosion, electrochemistry, electrochemical reactions, polarization, environmental factors, integranular corrosion, stress corrosion, high temperature corrosion, kinetics and mechanisms of corrosion, oxidation, liquid metal corrosion, irradiation effects. Prerequisite: approval of Department. (Fall, even years)

Environmental Effects on Materials II (3)

Corrosion problems in systems such as coal and oil-fired energy plants, fission and fusion reactors, gas turbines. Prerequisite: EngS 237. (Spring, odd years)

Physical Ceramics (3)

Crystal chemistry and the systematic study of the structure of ceramic materials; solid reactions occurring at elevated temperatures; sintering vitrification, diffusional mechanisms and effects; reaction rate theory; elastic, anelastic, and plastic properties of ionic and covalent solids; viscoelastic behavior of vitreous and vitreous-solid systems; phase equilibria of ceramic systems. Prerequisite: approval of Department. (Spring)

Fracture Mechanics (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechanics of fracture, linear elastic systems, plasticity considerations, fracture toughness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: EngS 221 or CE 261. (Fall)

Fatigue and Failure of Materials (3)

Extreme environments: oxidation, corrosion, high temperature creep; fatigue: cyclic hardening and softening, crack initiation and propagation, statistical analysis of strength. Prerequisite: approval of Department. (Fall)

Materials Recycling and Recovery (3)

Techniques and technologies for recovering and re-using waste materials and developing low-resource waste systems. Direct relationships of recycling and waste reduction to energy conservation. Effect of recycling on energy and environmental impacts of alternative materials and products; legal, economic, institutional, and environmental policy aspects of recycling and waste reduction. Prerequisite: approval of Department. (As arranged)

Special Topics in Materials Science (3)

Prerequisite: approval of Department. (As arranged)

Transportation Workshop (3–3)

Students and staff from various disciplines are brought together for study of a selected transportation topic, or for study of the land-use objectives and transportation needs of a selected urban area and a survey of pertinent information and applicable solutions. Prerequisite: approval of Department. (Academic year)

Control of Automated Transit Systems (3)

Automatic control techniques applied to automate various aspects of ground transportation system operation; discussion of application to rail, rapid rail, and small vehicle automated guideway transit systems; extension of road traffic characterizations to exclusive guideway transit

at NASA-Langley Research Center; may be offered on campus when arranged.

systems; operating policies for automatically controlled vehicles; i
plementation of vehicle speed and separation control systems for v
ious headways; design considerations for propulsion and braking syste
failsafe design principles; design case studies and examples of curre
technologies; impact of station and switch location on minimum headw
merging traffic control; vehicle routing and dispatching strategies
automated transit networks. Prerequisite: approval of Departme
(Spring)

256 **Introduction to the Theories of Inelastic Media** (3)
Physical basis of anelasticity, viscoelasticity, plasticity, and viscoplasti
constitutive equations of elastic and viscoelastic media; foundations of
theories of plasticity and viscoplasticity; boundary-value problems o
wave propagation in inelastic media. Prerequisite: ApSc 213 or equiva
and approval of Department. (Spring)

259 **Random Vibration of Structures** (3)
Introduction to random processes; responses of linear structures to
tionary and nonstationary random inputs; structural responses to ea
quakes, storm waves, boundary layer turbulences, wind loads, ra
temperature, etc.; failure analysis of structures under random loads
passage failure, fatigue, stress-corrosion and crack propagation u
random stress histories. Prerequisite: CE 252 or ME 215 or approva
Department. (Fall)

260 **Random Process Theory in Engineering** (3)
Spectral analysis, linear system, the superposition principle; statistical
diction and probability function, Rayleigh distribution and its proce
threshold crossing problems, prediction of extreme values; statistica
diction of random vibration, application to civil and mechanical engi
ing. Prerequisite: ApSc 115 or equivalent. (Fall)

*263 **Atmospheric Physics for Engineers I** (3)
Atmospheric radiation: phenomenological equation of transfer; solu
to the transfer equation; optical, physical, and chemical properties o
mospheric constituents; remote sensing and the direct inversion pro
energy transfer and atmospheric structure. Prerequisite: approval of
partment. (As arranged)

*264 **Atmospheric Physics for Engineers II** (3)
Atmospheric dynamics: mean structure of the atmosphere, tempera
pressure, and wind fields; mass, momentum, and energy transfer; s
scale features of atmospheric circulation; regional features of atmos
circulation; micrometerology. Prerequisite: approval of Department.
(As arranged)

270 **Theoretical Acoustics I** (3)
Basic acoustic theory in stationary and uniformly moving media; w
in infinite space; sound transmission through interfaces between la
media and between media in relative motion; sound radiation from v
solid boundaries, source and dipole fields; propagation inducts and
closures; elements of classical absorption of sound. Prerequisite: ME
and ApSc 213 or equivalent. (As arranged)

*271 **Random Process Theory I** (3)
Random processes; stationarity and ergodicity; mean-square calculus; s
and cross-correlations and spectra; random processes in linear syste

* Offered at NASA-Langley Research Center; may be offered on campus when arranged

mean-square estimation, prediction and filtering; zero and level crossings and peak distributions; applications in aerospace sciences. Prerequisite: EngS 203 or approval of Department. (As arranged)

72 Random Process Theory II (3)

Discrete and continuous state Markov-processes; chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: EngS 271. (As arranged)

73 Time Series Analysis (3)

Harmonic analysis of deterministic and random signals; auto- and cross-correlations and spectra; periodogram, Blackman-Tukey and direct filtering methods of spectral estimation; effects of finite length and digitization; variability; coherence. Fast Fourier transform techniques; applications in modern technology. Prerequisite: EngS 271 or approval of Department. (As arranged)

74 Environmental Noise Control (3)

(Formerly Noise and Vibration Control)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: EngS 270, ME 215. (As arranged)

75 Theoretical Acoustics II (3)

General theory of sound propagation in homogeneous media, viscous and heat conduction effects; methods of solving the inhomogeneous wave equation; theory of sound radiation, sources, dipoles, quadrupoles; radiation from moving sources; scattering and diffraction of sound by obstacles; introduction to acoustics of inhomogeneous media, geometric acoustics. Prerequisite: EngS 270. (As arranged)

76 Acoustical and Mechanical Measurements (3)

Characteristics of signals, basic transducer elements, standards of measurements and calibrations, signal recording and processing, acoustical and vibration instrumentation, vibration exciters, vibration testing techniques, flow mechanical measurements. Prerequisite: EngS 270, ME 215. (As arranged)

77 Physical Acoustics (3)

Concepts of continuum mechanics and thermodynamics, wave propagation in real media, thermal viscous and relaxational attenuations, piezoelectric crystals and ultrasonics, wave propagation in rigid and deformable porous media. Prerequisite: EngS 275. (As arranged)

78 Psychological and Physiological Acoustics (3)

Auditory system and its response to sound, experimental methodology in psychoacoustics, subjective response to sound, environmental noise and its evaluation, criteria for the prediction of noise nuisance, nonauditory system response to noise. Prerequisite: approval of Department. (As arranged)

* NASA-Langley Research Center; may be offered on campus when arranged.

***279 Human Factors in Engineering (3)**

Man-machine interface, effects of physical stress on human behavior a performance, life support system, learning and conditioning of physi stress. (Spring)

***280 Special Topics in Acoustics (3)**

Current methods and problems in acoustics. Topics chosen from suc areas as aerospace noise generation and control; instruments and proc dures for acoustics measurements; and responses of structures, people, an communities to noise. Prerequisite: approval of Department. (As ar ranged)

***281 Advanced Programming Techniques for Engineering Mechanics Problems (3)**

Techniques for efficient construction of large computer programs for engi neering systems with emphasis on fundamental structured programming principles. Application to engineering mechanics systems such as finite elements and structural optimization. Effects of CPU organization and other hardware features of computer systems at NASA-Langley on numer ical computations involved in engineering systems. Organization and management of data bases for large engineering mechanics systems. Pre requisite: approval of Department. (Spring)

282 Computer-aided Design (3)

Fundamental concepts in the development of computational algorithms for the design of structures, machine component and assemblies, and other engineering systems. Representation of the design process and de sign specifications as a network of decision tables and logical flags. Op timization techniques and algorithms in design applications. Interactive computer-aided design methods based on the use of remote access com puter terminals. General purpose computer programs for engineering analysis and design. Students, individually or in groups, are required to develop a small-scale general-purpose design program in an appropriate area such as structural design, machine design, urban planning, environ mental quality control, etc. Prerequisite: EE 51 or equivalent, and CS 210 or equivalent, and approval of Department. (Fall)

283 Application of Computer Graphics in Engineering (3)

Curve-fitting techniques as applied to computer graphics; constructing a library of geometric lines and curves connecting a series of discrete points. Representation of two- and three-dimensional geometrical shapes by a set of discrete points. Automatic generation and display on CRT screens of geometrical shapes consisting of a grid of discrete points interconnected by user-selected geometric shapes. Automatic mesh generation, transfor mations, projections, and the concept of "hidden" lines. Use of remote computer terminals and graphic plotter equipment in interactive computer graphics applications. Prerequisite: EE 51 or equivalent, and Engr or equivalent. (Spring)

284 Numerical Methods in Engineering (3)

Uses of computers in engineering and science; numerical interpolation, integration and differentiation; least squares approximations and appli cation to data fitting; roots of polynomials; eigenvalue and eigenvector problems; solution of systems of linear equations; ordinary differential equations; introduction to solution of partial differential equations,

* Offered at NASA-Langley Research Center; may be offered on campus when arranged.

plications to initial and two-point boundary value problems in engineering mechanics and other areas of engineering. Prerequisite: approval of Department. (Fall)

285 **Finite Element Methods in Engineering Mechanics** (3)

Formulation of the finite element method through variational principles for structural and continuum mechanics problems. Plane stress, plane strain, three-dimensional elasticity, plate bending, thermal conduction, and potential flow. Techniques of constructing and assembling characteristic elemental matrices, computer implementation of the finite element method. Prerequisite: approval of Department. (Spring)

286 **Analysis and Design of Thin-walled Structures** (3)

Statics of thin-walled beams and panels, force interplay between stiffeners and skin in the analysis and design of stiffened thin-walled structures; strength and stiffness of locally buckled stiffened structures; classification of loads and safety factors; different considerations governing the design of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: approval of Department. (As arranged)

287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of Department. (As arranged)

288 **Advanced Finite Element Methods in Structural Mechanics** (3)

Formulation of various finite element models in solid mechanics. Examination of errors, convergence characteristics. Application to nonlinear and dynamic problems including large deflection, stability, and inelastic problems. Recent developments of finite element methods. Prerequisite: EngS 285. (As arranged)

289 **Special Topics in Theoretical and Applied Mechanics** (3)

Prerequisite: approval of Department. (As arranged)

298 **Research** (arr.)

Basic research projects as arranged. May be repeated for credit. (Fall and spring)

300 **Thesis Research** (3–3)

(Fall and spring)

310 **Aeroacoustics** (3)

General theory of aerodynamic sound generation and propagation, Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: EngS 275. (As arranged)

311 **Nonlinear Acoustics** (3)

Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of Department. (As arranged)

‡ NASA-Langley Research Center; may be offered on campus when arranged.

*312 **Theory of Random Vibration** (3)

Response of linear systems to stationary random inputs. Failures resul
ing from dynamic response. Response of space vehicle structures to
tense noise fields, measurement, and application. Prerequisite: EngS
ME 215. (As arranged)

*313 **Structural Acoustic Interaction** (3)

Coupled response of structures to sound, system of infinite extent, sys
of finite extent, sound radiation from structure, sound transmission th
structure. Panel response to turbulent boundary-layer excitation. S
radiation from mechanically excited structure vibration. Prerequis
EngS 270, 312. (As arranged)

314 **Advanced Numerical Methods in Engineering** (3)

Advanced methods for numerical solution to engineering problem
finite difference solutions to elliptic, parabolic, and hyperbolic equation
method of characteristics, implicit and explicit initial value methods,
their stability, optimization and mathematical programming meth
numerical solutions to integral equations, selected topics for fourth-g
eration computers. Prerequisite: EngS 284, ApSc 213. (Spring)

315 **Introduction to Nonlinear Mechanics of Continua** (3)

Polar decomposition, invariance, isotropy, representation theorems
invariants and isotropic tensor functions; deformation, kinematics, st
balance principles; principles for constitutive relations; applications
nonlinear elasticity and non-Newtonian fluids. Prerequisite: ApSc 21
(Spring)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying e
nation. May be repeated for credit. (Fall and spring)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for cr
(Fall and spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged



Electrical Engineering and Computer Science

Electrical Engineering and Computer Science

Professors M.F. Eisenberg, A.D. Friedman, R.B. Heller, W.K. Kahn, A. Meltzer, W.D. Maurer, R. Pickholtz *(Chairman)*
Adjunct Professors C. Feldman, E.M. Lipsey
Professorial Lecturers J.M. Aein, W.G. Batte, J.T. Coleman, W.F. Crosw J.F. Halldane, D. Hogan
Associate Professors A.M. Abd-Alla, E.H. Braun, J.D. Foley, H.J. Helgert, Hoffman, N. Kyriakopoulos, R.H. Lang, T.N. Lee
Associate Professorial Lecturers J.G. Adler, C. Alexander, Jr., J.W. Be W.T. Bisignani, L.L. Campbell, W.H. Carter, A. Das, E.C. Foudriat, Frenkel, A.S. Gill, B.M. Horowitz, J.A. Knight, R.E. Lawrence, H.E. D.M. LeVine, M.H. Loew, T.P. McGarty, R.E. Merwin, J.M. Raffel, Rohlfs, F.J. Ricci, D.C. Roberts, L.A. Rubin, A. Schneider, B.P. Shah, Shulman, R.D. Shults, J.L. Torres, C.C. Wang, W. Wasylkiwskyj, Wood, R.M. Zeskind
Assistant Professor M.B. Feldman
Assistant Professorial Lecturers G. Babaoglu, J. Bisaga, T.M. Bottegal, Bronder, F.M. Brosi, J.H. Carson, T.L. Collins, J.W. Cowan, N. Dre C. Dunham, P.J. Fox, I. Haber, D.C. Karlgaard, J.C. Keenan, A. Ma D.H. Pugh, R. Schneider, J. Silverman, J.H. Tucker, P. Volkmar, P. Wa D. Woolf, A. Zachai
Special Lecturer P. Bock

UNDERGRADUATE STUDY

Electrical engineering as an engineering discipline is concerned with mass a knowledge of electricity. Electrical engineers design generators, which vide electrical energy for homes and factories, and transmission networ the motors which utilize this power to drive machinery. By developing magnetic radiation, electrical engineers produce radio waves for the propa of radio and television signals and the transmission of information via sat Electrical engineers design and develop electronic circuits used in comm tions equipment and computers. These machines have enhanced our th and computational capabilities to permit mankind to solve some of its complicated problems. Microminiaturization of electronic components ha mitted the development of handheld calculators and portable communi equipment. Electrical engineers are developing new instrumentation to the medical profession in understanding the causes of disease and to aid serving and prolonging life. The production of electricity from nuclear and control of nuclear power plants is of growing concern to electrical neers. The world's primary energy sources are limited, and electrical power become an even more important resource. Electrical engineers are involv the research to produce electrical energy directly from solar power.

Electrical engineering is a branch of engineering in which practical as as theoretical and scientific aspects are integrated into a well-balanced di Basic sciences such as physics and mathematics form the roots on which trical engineering builds to create an applied science and to develop pro solving techniques. Analysis, synthesis, and design go hand in hand. electrical engineering curriculum provides the student with such an integ

...eh. The first two years of the curriculum are common to all undergrad-...ms in the School and develop a sound foundation of basic sciences ...with engineering sciences. The third year continues with engineering ...and begins an in-depth study of electrical engineering. The fourth ...devoted totally to electrical engineering. At the fourth year the student ...choice of either following the regular electrical engineering curriculum ...ching off into an area of concentration in computer science or in pre-...engineering.

...Department of Electrical Engineering and Computer Science has modern ...ory equipment, including its own computer. The student has an oppor-...during the last year to work on individual projects where ingenuity, ...with faculty advice and guidance, allows concentration in areas such as ...ers, communications, microwaves, controls, electronics, medical engineer-...circuits.

...e schedules have been arranged to accommodate the full-time, the ...e, and the co-op student. Undergraduate courses are offered once a ...ing the day for full-time students, and once every two years in the ...for part-time students.

...Areas

...NICATIONS

...E 143: Elements of Communication Engineering Design I
...E 144: Elements of Communication Engineering Design II

...ER SCIENCE

...Sci 51: Applications of Computers
...Sci 52: Computers and Societal Problems
...ci 152: Introduction to Digital Computers
...ci 153: Design of Switching Systems
...ci 154: Digital Computer Design
...ci 155: Introduction to Numerical Methods for Computers
...ci 156: Introduction to Systems Programming
...ci 157: Machine and Assembly Language Programming
...ci 158: Algorithmic Methods and High-level Languages
...ci 159: Programming and Data Structures
...61-62: Computer Science Laboratory

...LS AND SYSTEMS

...E 172: Control Systems Design
...E 177: Electrical Energy Conversion
...E 178: Electrical Power Systems

...NICS

...E 20: Introductory Engineering Electronics
...E 121: Engineering Electronics and Design
...E 122: Pulse and Waveshaping Electronic Design
...E 124: Electronic Devices

FIELDS AND WAVES

EE 31:	Fields and Waves I
EE 32:	Fields and Waves II
EE 133:	Electromagnetic Waves and Microwave Systems Design

LABORATORIES AND MEASUREMENT

EE 60:	Introductory Electrical Engineering Laboratory I
EE 61:	Introductory Electrical Engineering Laboratory II
EE 160:	Electrical Measurements and Instrumentation
EE 161–62:	Electrical Engineering Laboratory
EE 165:	Senior Design Project

MEDICAL ENGINEERING

EE 184:	Medical Engineering Instrumentation and Systems Design

NETWORKS

EE 11:	Linear Networks I
EE 12:	Linear Networks II
EE 113:	Network Analysis and Design
EE 116:	Introduction to Network Synthesis

Core Curriculum

Normally the first four semesters are common to all undergraduate fields in the School of Engineering and Applied Science.

First Semester

EE 51:	Applications of Computers (3)
Math 30–31:	Precalculus and Calculus of One Variable (3)*
or	
Math 31:	Calculus of One Variable (3)
Phys 3:	Foundations of Physics (3)
Engl 9 or 10:	English Composition: Language as Communication (3)
Elective:	Selected from humanities or social sciences (3)

Second Semester

EE 52:	Computers and Societal Problems (3)
Math 32:	Calculus of Several Variables (3)†
Math 33:	Calculus of Vector Functions (3)†
Phys 14:	Introductory Mechanics and Thermal Physics (3)
Elective:	Selected from humanities or social sciences (3)

* Transfer students who have not successfully completed a college-level calculus course with a grade of *C* or better from an accredited institution, or high school students who did not take an advanced placement (AP) calculus course and receive a score of 4 or 5 on the AP test, will be required to take a one-hour locally administered math placement test at registration. This test covers algebra, trigonometry, and graphs. Students who do not place directly into Math 31 (Calculus) as a result of this test will be required to undertake a combined pre-calculus and calculus course (Math 30–31) during their first semester; this combined course meets five hours per week and carries three semester hours of credit if the student completes the second half.

† Math 32 and Math 33 may be taken in a one-semester combined course, Math 32–33

Third Semester

ApSc 57: Analytical Mechanics I (2)
ApSc 113: Engineering Analysis I (3)
ApSc 115: Engineering Analysis III (3)
Chem 13: General Chemistry (4)
Phys 15: Elements of Electricity and Magnetism (3)
Elective: Selected from humanities or social sciences (3)

Fourth Semester

ApSc 58: Analytical Mechanics II (3)
ApSc 114: Engineering Analysis II (3)
CE 140: Materials Science (3)
EE 11: Linear Networks I (3)
Phys 16: Introduction to Modern Physics (3)
Elective: Selected from humanities or social sciences (3)

...al Engineering Curriculum

Fifth Semester

EE 12: Linear Networks II (3)
EE 20: Introductory Engineering Electronics (3)
EE 31: Fields and Waves I (3)
EE 60: Introductory Electrical Engineering Laboratory I (2)
EE 137: Machine and Assembly Language Programming (3)
Elective: Selected from humanities or social sciences (3)

Sixth Semester

EE 32: Fields and Waves II (3)
EE 61: Introductory Electrical Engineering Laboratory II (2)
EE 121: Engineering Electronics and Design (3)
EE 152: Introduction to Digital Computers (3)
EE 177: Electrical Energy Conversion (3)
Elective: Selected from humanities or social sciences (3)

Seventh Semester

EE 122: Pulse and Waveshaping Electronic Design (3)
EE 143: Elements of Communication Engineering Design I (3)
EE 161: Electrical Engineering Laboratory (2)
Elective: Technical electives (9) (three courses selected from EE 113, 133, 153, 155, 178; ME 131, 187)

Eighth Semester

EE 144: Elements of Communication Engineering Design II (3)
EE 162: Electrical Engineering Laboratory (2)
EE 172: Control Systems Design (3)
Elective: Technical electives (5) (two courses selected from EE 116, 124, 160, 165, 184; ME 194)

Technical Electives

EE 113: Network Analysis and Design (3)

EE 116:	Introduction to Network Synthesis (3)
EE 124:	Electronic Devices (3)
EE 133:	Electromagnetic Waves and Microwave Systems Design (3)
EE 153:	Design of Switching Systems (3)
EE 155:	Introduction to Numerical Methods for Computers (3)
EE 160:	Electrical Measurements and Instrumentation (3)
EE 165:	Senior Design Project (2)
EE 178:	Electrical Power Systems (2)
EE 184:	Medical Engineering Instrumentation and Systems Design (3)
ME 131:	Thermodynamics (3)
ME 187:	Heat Transfer Theory (3)
ME 194:	Energy Conversion (3)

Computer Science Option

Computer science is a developing discipline which combines electronic de
programming of computers, and mathematics into one comprehensive
The student learns the design and utilization of computers for scientific
business applications. Students who complete this option will be able to
both hardware and software needed for minicomputer and large-scale
puting systems. The student will also be competent in hardware and
ware utilization of computers for control of large systems. The curr
prepares the student for a career in computer design, applications, and
tion, or to continue study in graduate school.

Prerequisite: first four semesters as described in the Core Curriculum, pages 110–111.

Fifth Semester

CSci 157:	Machine and Assembly Language Programming (3)
EE 12:	Linear Networks II (3)
EE 20:	Introductory Engineering Electronics (3)
EE 31:	Fields and Waves I (3)
EE 60:	Introductory Electrical Engineering Laboratory I (2)
Elective:	Selected from humanities or social sciences (3)

Sixth Semester

CSci 152:	Introduction to Digital Computers (3)
CSci 159:	Programming and Data Structures (3)
EE 32:	Fields and Waves II (3)
EE 61:	Introductory Electrical Engineering Laboratory II (2)
EE 121:	Engineering Electronics and Design (3)
Elective:	Selected from humanities or social sciences (3)

Seventh Semester

CSci 153:	Design of Switching Systems (3)
CSci 155:	Introduction to Numerical Methods for Computers (3)
CSci 158:	Algorithmic Methods and High-level Languages (3)
CSci 161:	Computer Science Laboratory (2)
EE 122:	Pulse and Waveshaping Electronic Design (3)
Elective:	Technical elective (3) (one course selected from EE 113, 143)

Eighth Semester

Digital Computer Design (3)
Introduction to Systems Programming (3)
Computer Science Laboratory (2)
Control Systems Design (3)
Technical elective (3) (one course selected from EE 124, 144, 184)

Technical Electives

Network Analysis and Design (3)
Electronic Devices (3)
Electromagnetic Waves and Microwave Systems Design (3)
Elements of Communication Engineering Design I (3)
Elements of Communication Engineering Design II (3)
Medical Engineering Instrumentation and Systems Design (3)

ical Engineering Option

Premedical Engineering option will permit the student who completes the to obtain a bachelor's degree in engineering and have sufficient prepara- apply to a medical school for work toward a doctor of medicine degree. tudent will also have sufficient background to work in various allied fields, in the research and development of new electronic equipment medicine, or to continue as a graduate student in engineering with ex- qualifications for medical engineering.

requisite: first four semesters as described in the Core Curriculum, see 110–111.

Fifth Semester

Introductory Biology for Science Majors (4)
Linear Networks II (3)
Introductory Engineering Electronics (3)
Fields and Waves I (3)
Introductory Electrical Engineering Laboratory I (2)
Machine and Assembly Language Programming (3)

Sixth Semester

Introductory Biology for Science Majors (4)
Introductory Quantitative Analysis (4)
Fields and Waves II (3)
Introductory Electrical Engineering Laboratory II (2)
Engineering Electronics and Design (3)
Introduction to Digital Computers (3)

Seventh Semester

Organic Chemistry (3)
Organic Chemistry Laboratory (1)
Pulse and Waveshaping Electronic Design (3)
Elements of Communication Engineering Design I (3)
Electrical Engineering Laboratory (2)

Elective:	Selected from humanities or social sciences (3)
Elective:	Technical elective (3)

Eighth Semester

Chem 152:	Organic Chemistry (3)
Chem 154:	Organic Chemistry Laboratory (1)
EE 144:	Elements of Communication Engineering Design II (3)
EE 162:	Electrical Engineering Laboratory (2)
EE 172:	Control Systems Design (3)
Elective:	Selected from humanities or social sciences (3)
Elective:	Technical elective (3)

Technical Electives

Bioc 221–22:	General Biochemistry (3–4)
BiSc 145:	Introduction to Vertebrate Embryology (4)
BiSc 148:	Histology (4)

Electrical Engineering Undergraduate Courses

11 Linear Networks I (3)

Signals and waveforms, average value and RMS, network concepts, elements, and parameters. Kirchhoff's laws, simple networks, energy, power, differential equations of networks and their solution, phasors, steady-state analysis, measurements, impedance concepts, resonance, filtering. Prerequisite: Phys 15, ApSc 113. (Spring—day and evening; fall—evening)

12 Linear Networks II (3)

Singular functions; Laplace transform; network functions, poles and zeros, total response; time and frequency domains; convolution theorems; Fourier analysis, spectra; frequency response, Bode plots; two-port parameters. Prerequisite: ApSc 114, EE 11. (Every fall—day and evening; spring—evening)

20 Introductory Engineering Electronics (3)

Various types of devices used in electronic engineering considered from the point of view of the physics of their operation and from the engineering point of view of their application to electronic circuits. Solid-state, vacuum, and gaseous devices. Primary emphasis on application of these elements in power supplies and in linear amplifiers. Introduction to design concepts through use of graphical techniques. Prerequisite: EE 11. (Fall—day and evening; spring—evening)

31 Fields and Waves I (3)

Vector calculus, orthogonal coordinates, Coulomb's and Gauss' laws, scalar potential, dipoles, method of images, Laplace's and Poisson's equations, boundary-value problems. Prerequisite: Phys 15, 16; ApSc 114. (Spring—day; fall, even years—evening)

32 Fields and Waves II (3)

Biot-Savart law, Ampere's law, vector potential, magnets, polarization, polarization currents, Faraday's law, Maxwell's equations, plane waves, and Poynting vector. Prerequisite: EE 31. (Every spring—day; spring, odd years—evening)

51 **Applications of Computers** (3) (Same as CSci 51)

Introduction to the solution of problems on a digital computer using the FORTRAN or BASIC languages; data processing concepts and numerical methods using batch or interactive time-shared terminal computer systems; writing, debugging, and running programs on various digital computer systems. (Academic year—day and evening)

52 **Computers and Societal Problems** (3) (Same as CSci 52)

Application of the digital computer to the analysis and synthesis of physical, social, cultural, economic, and environmental processes and systems. Software methods for simulation, graphic display, data reduction, and file generation and access in time-shared and batch environments using FORTRAN or BASIC. Computer-related societal problems and processes. Group projects emphasizing research and investigative techniques applied to student-selected interests. Prerequisite: CSci or EE 51 or equivalent; two years of college preparatory mathematics. (Spring—day and evening)

60 **Introductory Electrical Engineering Laboratory I** (2)

Use, theory of design, and application of standard electronic laboratory equipment; applications of instrumentation through experiments in basic network theorems; measurement of electrical quantities and characteristics of electrical devices. Prerequisite or concurrent registration: EE 12, 20, 31. (Fall—day and evening; spring—evening)

61 **Introductory Electrical Engineering Laboratory II** (2)

Characteristics of electronic devices and circuits; design of electronic amplifiers and measurement of their properties; experiments in support of courses in networks, fields, and electronics. Prerequisite or concurrent registration: EE 12, 32, 60, 121. (Spring—day and evening; fall—evening)

113 **Network Analysis and Design** (3)

Applications of matrix theory and linear graphs to electrical network analysis; network equations; signal-flow graphs; introduction to state-space techniques; solution of state-space equations on a digital computer. Network transfer functions, properties of active networks including reciprocity, stability, activity, and feedback. Use of network analysis programs such as ECAP. Prerequisite: EE 12, 20. (Every fall—day; fall, even years—evening)

116 **Introduction to Network Synthesis** (3)

Network functions and their properties. Positive-real functions and testing for this property. Two-element, one-port network synthesis; RLC one-port synthesis; the approximation problem in the frequency domain; modern filter theory and design; two-port ladder and lattice synthesis. Introduction to digital filters; truncation errors; realization techniques. Prerequisite: EE 113. (Every spring—day; spring, odd years—evening)

[illegible] **Engineering Electronics and Design** (3)

Graphical analysis and design beyond the level covered in EE 20. Introduction of incremental analysis and design methods to electronic circuits; use of equivalent circuits; amplifiers, oscillators, modulation and demodulation. Prerequisite: EE 12, 20. (Every spring—day; academic year—evening)

122 **Pulse and Waveshaping Electronic Design** (3)
Introduction to and design of nonlinear circuits used in modern-day co
puter and communications systems. Pulse, sweep, switching, and logic c
cuits; counting and timing circuits. Prerequisite: EE 121. (Every
—day; fall, even years—evening)

124 **Electronic Devices** (3)
Principles of operation of electronic devices used in electrical netwo
communication systems, and electronic circuits. Properties of electro
devices and their applications. Modeling of devices such as diodes, t
sistors, and lasers. Fabrication methods of discrete components and
grated circuits. Prerequisite: EE 12, 32, 121; Phys 16. (Every
—day; spring, odd years—evening)

133 **Electromagnetic Waves and Microwave Systems Design** (3)
Time-harmonic Maxwell equations, complex Poynting vector, transmi
lines, characteristics of common waveguides, resonant cavities, Smith
design of coaxial and waveguide systems, Lorentz reciprocity, sca
antennas, design of linear antenna arrays. Prerequisite: EE 32.
fall—day; fall, even years—evening)

143 **Elements of Communication Engineering Design I** (3)
Fourier series and transforms; power spectra and correlation: princip
modulation; amplitude, angle, and pulse modulation; modulation
modulation systems; time and frequency division multiplexing
parison of communication systems optimized for their design in a
channel. Prerequisite: EE 12, 121. (Every fall—day; fall, odd
evening)

144 **Elements of Communication Engineering Design II** (3)
Introduction to the statistical theory of communication, random
and noise, concepts of information theory, transmission of infor
over noisy channels, comparison of modulation systems in the pres
noise. Prerequisite: ApSc 115, EE 143. (Every spring—day;
even years—evening)

152 **Introduction to Digital Computers** (3) (Same as CSci 152)
Design of digital computers using integrated circuits. Combinational
and digital logic circuits. Boolean algebra, number systems, codes,
arithmetic operations in digital computers. Use of LSI in digital
Microprocessors and interfacing with I/O equipment. Minicomputer
sign and programming. Analog computers, analog-to-digital conver
and analog components. Prerequisite: CSci 157 or permission of
tor. (Fall—evening; spring—day and evening)

153 **Design of Switching Systems** (3) (Same as CSci 153)
Switching algebra and Boolean logic; sets, relations, and lattices. Appl
and design of switching devices; design of combinational logic
Minimization techniques and decomposition methods. Electronic
mentation of logic; contact networks, symmetric functions, and thr
logic. Reliable design and fault-detection tests. Number systems and
geometric interpretation, error detecting and correcting codes: encoders
decoders. Logic and electronic design of functional digital units. Sequ
tial circuits and iterative networks. Minimization and transformation
quential machines; structure of sequential machines; partitions and
State identification and fault-detection experiments. Prerequisite:
EE 152 or permission of instructor. (Fall—day and evening)

54 Digital Computer Design (3) (Same as CSci 154)

Logic and electronic design of functional digital units. Design of digital computer subsystems, flow of information and logical flow diagrams in timing and control signals. Design of binary and decimal, serial and parallel digital arithmetic units. Design of memory subsystems, channels, I/O, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CSci or EE 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

55 Introduction to Numerical Methods for Computers (3) (Same as CSci 155)

Use of numerical methods in engineering and scientific problems. Concepts of algorithm and flowchart, errors in computer and numerical methods. Introduction to numerical methods for the solution of simultaneous linear algebraic equations, roots of equations, determination of eigenvalues and eigenvectors, numerical differentiation and integration, interpolation and solution of ordinary and partial differential equations. Statistical methods for the evaluation of experimental data and correlation techniques, curve fitting. Prerequisite: ApSc 114, 115; CSci or EE 51; or equivalent. (Every fall—day; fall, even years—evening)

56 Introduction to Systems Programming (3) (Same as CSci 156)

Computer software systems; concepts in the use of macro-assemblers, loaders, monitors, dispatchers, initiators, and control programs. Control of input-output in a multiprogrammed environment. Control of the task, job stream, and secondary storage. Job control languages. Prerequisite: CSci 158 and CSci 159. (Spring—day; spring, even years—evening)

57 Machine and Assembly Language Programming (3)(Same as CSci 157)

Architecture of various digital computers. Number systems and codes. Programming of minicomputers and multiprogrammed large computers in machine and assembly language. Techniques in structured programming. Methods of addressing and machine control for fixed and variable word-length computers. Programming on a stack architecture computer. Input-output control on a minicomputer. Prerequisite: CSci or EE 51 or equivalent. (Fall—day and evening; spring—evening)

58 Algorithmic Methods and High-level Languages (3)(Same as CSci 158)

High-level programming languages. Comparison of computer languages and their structure. Structured programming with high-level languages. Introduction to compiler structure and parsing of statements. Syntax of high-level languages and their recognizers. Backus-Normal form, correctness of programs, reentrant programming and reentrant compilers. Prerequisite: CSci 157 or permission of instructor. May be taken for graduate credit. (Fall—day and evening; spring—evening)

59 Programming and Data Structures (3) (Same as CSci 159)

Use of macro-assembler, subroutine linkages and I/O in an assembler, access methods and storage management, buffer pools and memory management, discrete structures and data structures in computing. Use of tree structures, arrays, lists, stacks, files, strings and linked structures. Sorting, searching, hashing, and merging of data files. List and string processing languages. Prerequisite: CSci or EE 157; or equivalent. (Spring—day and evening)

160 **Electrical Measurements and Instrumentation** (3)

Electrical measurement from direct current through high radio frequenci
Measurements of current, voltage, power, resistance, capacitance, indu
ance, energy, phase angle, frequency, and time. Measurements of bas
frequency signals including field strength, signal-to-noise ratio, impedan
and attenuation. Analog-to-digital conversion techniques and digital instr
mentation for the control of measurement and instrumentation system
Transducer characteristics and analog signal processing instrumentatio
Laboratory demonstrations of measurements and instrumentation tec
niques. Prerequisite: EE 12, 32, 121, 152. (Spring—evening)

161–62 **Electrical Engineering Laboratory** (2–2)

Experiments in support of courses in networks, electronics, microwave
computers, communications, controls, and machines. The student is re
quired to begin a design project in EE 161 and complete it in EE 16
Prerequisite or concurrent registration: EE 61, 113, 122; CSci or EE 1
EE 161 is prerequisite to EE 162. (Academic year—day and evening)

165 **Senior Design Project** (2)

The student will conceive, design, construct, and test an original proj
in hardware or software. He will write a complete report including
schematic diagrams and repair procedures, if applicable. This proj
cannot be used to satisfy the project required in EE 161–62 *Electr
Engineering Laboratory*. Prerequisite: senior status. (Spring—da

172 **Control Systems Design** (3)

Mathematical models of linear systems; steady-state and transient analy
root locus and frequency response methods; synthesis of linear feedba
control systems. Prerequisite: ApSc 114; and EE 12 or ME 3
(Spring—day and evening)

177 **Electrical Energy Conversion** (3)

Fundamentals of electromechanical energy conversion. Electromechanical
transducers and their equivalent circuits, three-phase and single-phase
rotating machines, d-c machines, rotating machines as circuit elements
Prerequisite: EE 12, 31. (Every spring—day; spring, even years
evening)

178 **Electrical Power Systems** (2)

Introduction to electrical power systems; transmission and distribution
electrical power, three-phase circuits, symmetrical components, fault a
ysis by digital computer. Load-flow studies, economic considerations
Power station designs and synchronization of generators. Methods
generating electrical power. Prerequisite: EE 177, senior status.
(Fall—evening)

184 **Medical Engineering Instrumentation and Systems Design** (3)

Designed to introduce the engineering or physical sciences student to
applications of engineering design in the medical sciences: terminolo
of the medical profession emphasized; the physiology of the human
presented from overall systems or functional approach; survey of p
ent-day medical measurements and consideration of those areas in wh
engineering design may be applied advantageously to medicine. May
taken for graduate credit. Admission by permission of instruc
(Spring—evening)

98 Research (1 to 3)

Applied research and experimentation projects, as arranged. Prerequisite: junior or senior status. (Fall and spring)

puter Science Undergraduate Courses

51 Applications of Computers (3) (Same as EE 51)

Introduction to the solution of problems on a digital computer using FORTRAN or BASIC languages; data processing concepts and numerical methods using batch or interactive time-shared terminal computer systems; writing, debugging, and running programs on various digital computer systems. (Academic year—day and evening)

52 Computers and Societal Problems (3) (Same as EE 52)

Application of the digital computer to the analysis and synthesis of physical, social, cultural, economic, and environmental processes and systems. Software methods for simulation, graphic display, data reduction, and file generation and access in time-shared and batch environments using FORTAN or BASIC. Computer-related societal problems and processes. Group projects emphasizing research and investigative techniques applied to student-selected interests. Prerequisite: CSci or EE 51 or equivalent; two years of college preparatory mathematics. (Spring—day and evening)

52 Introduction to Digital Computers (3)

Design of digital computers using integrated circuits. Combinational logic and digital logic circuits. Boolean algebra, number systems, codes, and arithmetic operations in digital computers. Use of LSI in digital design. Micro-processors and interfacing with I/O equipment. Minicomputer design and programming. Prerequisite: CSci 157 or permission of instructor. (Fall—evening; spring—day and evening)

3 Design of Switching Systems (3)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: CSci 152 or permission of instructor. (Fall—day and evening)

4 Digital Computer Design (3)

Logic and electronic design of functional digital units. Design of digital computer subsystems, flow of information and logical flow diagrams in timing and control signals. Design of binary and decimal, serial and parallel digital arithmetic units. Design of memory subsystems, channels, I/O, and storage subsystems. Design of the control unit of a digital computer. Introduction to microprogramming. Design of a small digital computer. Prerequisite: CSci 153 or permission of instructor. May be taken for graduate credit. (Spring—day and evening)

155 Introduction to Numerical Methods for Computers (3)

Use of numerical methods in engineering and scientific problems. Co
cepts of algorithm and flowchart, errors in computer and numerical met
ods. Introduction to numerical methods for the solution of simultaneo
linear algebraic equations, roots of equations, determination of eigenvalu
and eigenvectors, numerical differentiation and integration, interpolatio
and solution of ordinary and partial differential equations. Statistical met
ods for the evaluation of experimental data and correlation technique
curve fitting. Prerequisite: ApSc 114, 115; CSci or EE 51; or equivalen
(Every fall—day; fall, even years—evening)

156 Introduction to Systems Programming (3)

Computer software systems; concepts in the use of macro-assembler
loaders, monitors, dispatchers, initiators, and control programs. Contr
of input-output in a multiprogrammed environment. Control of the tas
job, job stream, and secondary storage. Job control languages. Prereq
site: CSci 158, 159. (Spring—day; spring, even years—evening)

157 Machine and Assembly Language Programming (3)

Architecture of various digital computers. Number systems and code
Programming of minicomputers and multiprogrammed large computer
in machine and assembly language. Techniques in structured program
ming. Methods of addressing and machine control for fixed and variable
wordlength computers. Programming on a stack architecture computer
Input-output control on a minicomputer. Prerequisite: CSci or EE 51 o
equivalent. (Fall—day and evening; spring—evening)

158 Algorithmic Methods and High-level Languages (3)

High-level programming languages. Comparison of computer language
and their structure. Structured programming with high-level language
Introduction to compiler structure and parsing of statements. Syntax o
high-level languages and their recognizers. Backus-Normal form, correct
ness of programs, reentrant programming and reentrant compilers. Pr
requisite: CSci 157 or permission of instructor. May be taken for grad
uate credit. (Fall—day and evening; spring—evening)

159 Programming and Data Structures (3)

Use of a macro assembler, subroutine linkages and I/O in an assembly
access methods and storage management, buffer pools and memory ma
agement, discrete structures and data structures in computing. Use o
tree structures, arrays, lists, stacks, files, strings and linked structure
Sorting, searching, hashing, and merging of data files. List and string
processing languages. Prerequisite: CSci or EE 157 or equivalent
(Spring—day and evening)

161–62 Computer Science Laboratory (2–2)

Experiments in support of digital logic, electronics, systems and softwar
Use of integrated circuits and microprocessors to develop digital system
Interfacing I/O equipment to computers. Analog computing, hybrid com
puting, and A-to-D converters. The student begins a design project in
CSci 161 and completes it in CSci 162. CSci 161 is prerequisite to CSc
162. Prerequisite or concurrent registration: EE 61, 122; CSci 153, 15
158. (Academic year—day and evening)

GRADUATE STUDY

epartment of Electrical Engineering and Computer Science provides the who possesses a degree of maturity and basic knowledge one of the imulating experiences for advanced study. The Department offers study to the Master of Science, Professional, and Doctor of Science degrees. dent may study in an area of concentration such as Systems Science, s, and Controls; Electrophysics (electronics, fields, and waves); Comtions; Medical Engineering; Computer Science (hardware, software, and); Computer Heuristics, Modeling, and Numerical Methods; and Energy ion, Power, and Transmission.

graduate programs are formulated to take into consideration the stuindividual strengths, skills, aspirations, and abilities and are determined consultation by the student with the faculty adviser. The program provide the student with a thorough understanding of the area of conon and with a breadth of knowledge necessary in modern engineering mputer science. Each graduate student is assigned a faculty adviser on s of study interests, helping to develop a close student-faculty relationring the course of the program.

graduate programs are also designed to provide an educational service Washington technical community. Many courses have been developed nsultation with private industry and government agencies in the area. e offered both during the afternoon and evening and rotate from year r.

Department of Electrical Engineering and Computer Science has conly kept the graduate program up to date through contact with recent ments, research generated within the Department, and the addition of in appropriate fields who serve as part-time and adjunct faculty.

Department of Electrical Engineering and Computer Science publishes ed brochure to supplement the present catalogue with information about es, requirements, regulations, and scope of its graduate programs. pamphlets describing specific programs are also available.

Concentration

UNICATIONS

EE 204: Stochastic Signals and Noise
EE 205: Stochastic Processes in Electrical Engineering
EE 241: Information Theory
EE 242: Coding Theory
EE 243: Communication Theory I
EE 244: Communication Theory II
EE 245: Signal Detection and Estimation Theory
EE 246: Digital Communications
EE 247: Communication Systems
EE 249: Data Telecommunication Networks
EE 252: Digital Signal Processing Techniques
EE 253: Sonar Systems
EE 254: Radar Systems

tudents must select a minimum of three courses designated with an asterisk as part of their their major area.

EE 257:	Issues in Computer Communications
*EE 258:	Radio Communication Systems I
*EE 259:	Radio Communications Systems II
*EE 277:	Space Communication Systems
EE 298:	Research
EE 299–300:	Thesis Research
*EE 345:	Advanced Detection Theory
*EE 346:	Communications Switching and Traffic Theory
EE 347:	Data Communications
EE 349:	Communications Research
EE 399:	Dissertation Research

COMPUTER HEURISTICS, MODELING, AND NUMERICAL METHODS

ApSc 211:	Analytical Methods in Engineering I
ApSc 212:	Analytical Methods in Engineering II
ApSc 213:	Analytical Methods in Engineering III
ApSc 214:	Analytical Methods in Engineering IV
CSci 158:	Algorithmic Methods and High-Level Languages
CSci 201:	Introduction to Computer Systems I
CSci 202:	Introduction to Computer Systems II
CSci 213:	Discrete Structures in Computing
CSci 214:	Data Structures
CSci 219:	Interactive Computer Graphics
*CSci 220:	Pattern Recognition
CSci 223:	Simulation and Heuristics
CSci 224:	Artificial Intelligence
*CSci 232:	Automata Theory
CSci 278:	Analog and Hybrid Computers
CSci 281:	Applications of Numerical Methods I
CSci 282:	Applications of Numerical Methods II
CSci 285:	Approximation of Functions and Data Representations
*CSci 286:	Numerical Methods in Engineering I
*CSci 287:	Numerical Methods in Engineering II
*CSci 288:	Numerical Methods in Engineering III
*CSci 289:	Numerical Methods in Engineering IV

COMPUTER SCIENCE (HARDWARE, SOFTWARE, AND SYSTEMS)

CSci 201:	Introduction to Computer Systems I
CSci 202:	Introduction to Computer Systems II
CSci 208:	Computer Programming
CSci 213:	Discrete Structures in Computing
CSci 214:	Data Structures
CSci 216:	Information Retrieval Systems
CSci 219:	Interactive Computer Graphics
*CSci 220:	Pattern Recognition
CSci 222:	Design of User-Computer Dialogues
CSci 223:	Simulation and Heuristics
CSci 224:	Artificial Intelligence
CSci 227:	Management Information Systems and Data Base Management
CSci 229:	Security and Privacy in Computer Systems
CSci 232:	Automata Theory

* Doctoral students must select a minimum of three courses designated with an asterisk as part of the program in their major area.

CSci 237: Computing Systems
CSci 239: Comparative Computer Systems
CSci 240: Theory and Practice of Microprogramming
CSci 243: Fault Tolerant Systems and Design Automation
CSci 244: Data Communications
CSci 245: Advanced Computer Systems Theory I
CSci 246: Advanced Computer Systems Theory II
CSci 255: Formal Languages, Correctness, and Structured Programming
CSci 256: Design of Translators
CSci 258: Advanced Programming Languages
CSci 263: Digital Computer Programming Systems
CSci 267: Operating Systems I
CSci 268: Operating Systems II
CSci 278: Analog and Hybrid Computers
CSci 298: Research
299–300: Thesis Research
CSci 391: Computer Science Research
CSci 399: Dissertation Research

TROPHYSICS (ELECTRONICS, FIELDS, AND WAVES)

EE 201: Natural Modes and Transients in Electrical Systems
EE 206: Electromagnetic Theory and Applications I
EE 207: Electromagnetic Theory and Applications II
EE 221: Physical Electronics I
EE 222: Physical Electronics II
EE 223: Optical Communications Systems
EE 224: Electronics of Lasers
EE 225: Nonlinear Electronics
EE 226: Fiber and Integrated Optics
EE 227: Industrial Electronics
EE 228: High-frequency Electronics
EE 231: Field Analysis and Potential Theory
EE 232: Electrodynamics
EE 233: Microwaves and Components
EE 234: Electromagnetic Wave Propagation
EE 235: Antennas
EE 236: Plasma Dynamics
EE 237: Waves in Random Media
EE 255: Optical Processing
EE 298: Research
299–300: Thesis Research
EE 323: Principles of Microelectronics
EE 329: Electrophysics Research
EE 399: Dissertation Research

GY CONVERSION, POWER, AND TRANSMISSION

EE 201: Natural Modes and Transients in Electrical Systems
EE 202: Linear System Theory I
EE 212: Advanced Network Analysis
EE 261: Electromechanical Energy Conversion
EE 264: Direct Electrical Energy Conversion
EE 265: Electrical Power Production

udents must select a minimum of three courses designated with an asterisk as part of their
to their major area.

EE 266: Electrical Power Transmission and Distribution
EE 267: Power Networks
EE 269: Issues in Electrical Power Systems

MEDICAL ENGINEERING

EE 256: Environmental Optics
EE 281: Medical Instrumentation I
EE 282: Medical Instrumentation II
EE 283: Introduction to Medicine for Engineers I: Physiology and Anat
EE 284: Introduction to Medicine for Engineers II: Clinical Medicine
EE 285: Engineering in Physical Medicine and Rehabilitation
EE 286: Sensory-evoked Potentials I
*EE 287: Computer-aided Analysis of Physiological Signals
*EE 288: Physiological Controls and Systems
*EE 289: Clinical Engineering
EE 298: Research
EE 299–300: Thesis Research
*EE 381: Bioelectric Phenomena
*EE 386: Sensory-evoked Potentials II
EE 389: Medical Engineering Research
EE 399: Dissertation Research

SYSTEMS SCIENCE, NETWORKS, AND CONTROLS

EE 201: Natural Modes and Transients in Electrical Systems
EE 202: Linear System Theory I
EE 203: Linear System Theory II
EE 212: Advanced Network Analysis
*EE 213: Computer-aided Analysis and Design of Networks
*EE 215: Linear Network Synthesis I
*EE 216: Linear Network Synthesis II
EE 272: Discrete Systems
EE 273: System Optimization
*EE 274: Nonlinear Systems
*EE 275: System Identification and Adaptive Systems
EE 276: Cybernetics
EE 278: Spacecraft Systems Design
EE 298: Research
EE 299–300: Thesis Research
EE 319: Systems Science, Networks and Controls Research
*EE 371: Simulation Methods for System Analysis
*EE 372: Analysis and Control of Large Systems
EE 399: Dissertation Research

THE MASTER OF SCIENCE DEGREE PROGRAM

The Department of Electrical Engineering and Computer Science offers gra uate study leading to the degree of Master of Science in the following areas concentration. Faculty members who may serve as advisers are listed in each area.

1. Communications (Braun, Helgert, Heller, Lang, Pickholtz)
2. Computer Heuristics, Modeling, and Numerical Methods (Abd-Al Bock, Feldman, Foley, Hoffman, Maurer, Meltzer)

* Doctoral students must select a minimum of three courses designated with an asterisk as part of th program in their major area.

Computer Science (hardware, software, and systems) (Abd-Alla, Bock, ...an, Foley, Friedman, Hoffman, Kyriakopoulos, Maurer, Meltzer)
Electrophysics (electronics, fields, and waves) (Braun, Eisenberg, Heller, ...Lang)
Energy Conversion, Power, and Transmission (Kahn, Lang, Meltzer)
Medical Engineering (Eisenberg)
Systems Science, Networks, and Controls (Kyriakopoulos, Lee, Meltzer)

...here are no required courses or programs of study in any of the areas of ...ntration. Each student formulates an individualized program in consulta... with the assigned faculty adviser.

...ssion

...addition to the general requirements, the applicant must have satisfied ...sion to graduate study (see page 23), applicants for Master of Science ...rams in the Department of Electrical Engineering and Computer Science ...meet the following general and specific requirements.

...ERAL REQUIREMENTS

The applicant must be recommended for admission by the Chairman of ...Department of Electrical Engineering and Computer Science.
The applicant must have at least a quality-point index of 2.50 (on a ... with 4.00 maximum), or equivalent, for the last 60 semester hours of ...graduate work.
The applicant must be adequately prepared in the basic sciences (physics, ...chemistry or biology) and in mathematics (calculus through differential ...ions).

...IFIC REQUIREMENTS

...addition to the general requirements, the applicant must have satisfied ...h undergraduate studies the following specific requirements according ... area in which he or she plans to concentrate:

...unications
...Networks with applications using Laplace transforms (6 semester hours— ... and 12; or equivalent)
...Electronics (3 semester hours—EE 20; or equivalent)
...Communication theory (3 semester hours—EE 143; or equivalent)

...uter Heuristics, Modeling, and Numerical Methods
...Computer programming using FORTRAN (3 semester hours—CSci 51; ...valent)
...Mathematics including partial differential equations, matrices, and eigen... problems)
...Probability and statistics (3 semester hours—ApSc 115; or equivalent)

...uter Science
...Computer programming using FORTRAN (3 semester hours—EE 51; ...valent)

2. Computer hardware and computer software (6 semester hours—CSci 1
and CSci 157; or equivalent)

Electrophysics

1. Networks with applications using Laplace transforms (6 semester hours
EE 11 and 12; or equivalent)
2. Electronics including analysis, design, and physical theory (6 semes
hours—EE 20 and 121; or equivalent)
3. Fields and waves (6 semester hours—EE 31 and 32; or equivalent)

Energy, Conversion, Power, and Transmission

1. Network analysis using Laplace transforms (6 semester hours—EE
and 12; or equivalent)
2. Fields and waves (6 semester hours—EE 31 and 32; or equivalent)
3. Electrical energy conversion (3 semester hours—EE 177; or equivale

Medical Engineering

1. Network theory (3 semester hours—EE 11; or equivalent)
2. Electronic circuits (6 semester hours—EE 20 and 121; or equivalent)
3. Computer programming (3 semester hours—CSci 51; or equivalent)

Systems Science, Networks, and Controls

1. Networks with applications using Laplace transforms (9 semester hours
EE 11, 12, and 113; or equivalent)
2. Electronics (3 semester hours—EE 20; or equivalent)
3. Control theory (3 semester hours—EE 172; or equivalent)

In cases where some undergraduate deficiencies exist, the student may
required to complete 6 semester hours of undergraduate work. Normally
work must be completed prior to enrolling in graduate courses. If such
ficiencies represent more than 6 semester hours, the applicant may be
mitted as an unclassified student to complete a specified undergraduate progra
before being admitted as a graduate student.

Program of Study

Upon admission to the Master of Science degree program, the graduate
dent is assigned a faculty adviser. In consultation, the student and fac
adviser formulate the program of study and complete the form "Grad
Program of Studies" (Form 1) for submission to the Department Chair
for approval. This form should be completed prior to or at the student's
registration. During consultation, the student should determine whether
request permission to pursue the nonthesis option.

The program of study for the Master of Science degree will consist
minimum of 24 semester credit hours of graduate-level courses and 6 semes
hours of thesis; or, for the nonthesis option, a minimum of 33 credit hours
graduate-level courses. For the thesis option, a minimum of 12 credit hou
must be in the major field of concentration, and no less than three gradua
courses must be in areas other than the student's area of concentration (ma
For the nonthesis option, a minimum of 21 credit hours must be in the ma
field, and no less than three courses must be in areas other than the student's
major area.

maximum of two courses at the 100 level may be counted toward the ements for the degree; the course description must specify that the may be taken for graduate credit.

's Comprehensive Examination

completing the prescribed program in either the thesis or the nonthesis the student must pass the Master's Comprehensive Examination. The ation is scheduled twice a year (see Calendar). On the prescribed form, dent must notify the Department by the date shown on the Calendar of dent's intent to take the examination. Thereafter, requests to withdraw be submitted in writing in advance of the examination date. Unexcused ab- constitutes a forfeiture and is regarded as a failure of the examination. amination lasts an entire day, and the student is asked to solve several ems relating to the subject matter of his major area of study. The student demonstrate the ability to apply what has been learned while pursuing al graduate program. The examination is not limited to those specific es which the student has taken, but is designed to demonstrate the stu- ability to integrate material from several course areas as well as to learn he readings.

student who fails the Master's Comprehensive Examination on his first pt may be re-examined one more time if approval is given by the ap- ate examining committee. In the event of failure to pass the examina- n the second attempt, the student's candidacy and graduate status ter- g.

THE PROFESSIONAL DEGREE PROGRAM

Department of Electrical Engineering and Computer Science offers grad- udy leading to a Professional degree. This program provides for those ts who are interested in pursuing course work beyond the Master's with emphasis on applied subject material rather than on research. sful completion of the Professional degree program leads to the degrees gineer or Applied Scientist. Students may study for the Professional in the following areas of concentration: Communications; Computer e (hardware, software, and systems); Electrophysics (electronics, and waves); Medical Engineering; Systems Science, Networks, and ols; Energy Conversion, Power, and Transmission; and Computer Heuris- Modeling, and Numerical Methods.

re are no formal required courses or programs of study in any of the of concentration for the Professional degree. Each student formulates dividualized program in consultation with the assigned faculty adviser.

ssion

dition to the School of Engineering and Applied Science requirements dmission to graduate study toward a Professional degree (see pages 27– pplicants for the Professional degree programs in the Department of ical Engineering and Computer Science must meet the following general pecific requirements.

GENERAL REQUIREMENTS

1. The applicant must be recommended for admission by the Chairman the Department of Electrical Engineering and Computer Science.

2. The applicant must have at least a quality-point index of 3.2 (on a sc of 4.00 maximum), or equivalent, in graduate course work leading to t Master's degree; or a minimum of 3.0 and two years of professional exper ence after obtaining the Master's degree.

3. The applicant must be adequately prepared in the basic sciences (physi and chemistry or biology) and in mathematics (calculus through differen equations).

SPECIFIC REQUIREMENTS

In addition to the general requirements, the applicant must also satis through previous studies the following specific requirements according to t area of concentration:

Communications

Nine semester hours of statistical theory of communication and 3 semest hours of information theory—EE 204, 241, 243, and 244; or equivalent.

Computer Heuristics, Modeling, and Numerical Methods

Twelve semester hours of computer science and numerical methods at th graduate level—CSci 201, 223, 281, and 282; or equivalent.

Computer Science

Twelve semester hours of computer system design and software beyond th use of a compiler language—CSci 201, 202, 213, and 214; or equivalent.

Electrophysics

Twelve semester hours of physical electronics and electromagnetics at th graduate level—EE 201, 206, 207, and 221; or equivalent.

Energy Conversion, Power, and Transmission

Nine semester hours of electrical machine theory and networks at the grad uate level—EE 202, 261, and 266; or equivalent.

Medical Engineering

Twelve semester hours of medical engineering at the graduate level—EE 28 282, 283, and 284; or equivalent.

Systems Science, Networks, and Controls

Twelve semester hours of network system analysis at the graduate level in cluding a knowledge of state space and linear graph theory—EE 201, 202, 20 and 273; or equivalent.

An applicant who fails to meet the above specific requirements, but m all other admission requirements, may be admitted with a program of st which is increased beyond the minimum requirements so that sufficient fund ground material may be covered.

Program of Study

Upon admission to the Professional degree program, the student is assigned faculty adviser. Together they will formulate a program of study for the st

which must contain a minimum of 30 semester hours of courses, and ete the form "Graduate Program of Study." Programs of study and any sequent changes must be approved by both the faculty adviser and the rtment chairman.

e program of study for the Professional degree in the Department of rical Engineering and Computer Science will normally consist of a mini- of 18 semester hours of graduate-level courses in the major area of con- tion and a minimum of 9 additional semester hours of graduate-level es outside the major area but in support of the student's program. A t who is changing the major area from that studied for the Master's e or who is lacking the specific requirements needed for admission may quired to take additional courses to make up deficiencies. Such addi- l work should not normally exceed 12 semester hours.

THE DOCTOR OF SCIENCE PROGRAM

Department of Electrical Engineering and Computer Science offers pro- s of graduate study leading to the degree of Doctor of Science in the of concentration listed below. There are no formal required courses or ams of study in the areas listed. Upon admission, each student formulates dividualized program in consultation with the assigned faculty adviser. ty members who may serve as advisers are listed after each area.

Communications (Braun, Helgert, Heller, Lang, Pickholtz)

Computer Heuristics, Modeling, and Numerical Methods (Bock, Feld- Foley, Hoffman, Maurer, Meltzer)

Computer Science (Abd-Alla, Bock, Feldman, Foley, Friedman, Hoffman, r, Meltzer)

Electrophysics (Braun, Eisenberg, Heller, Kahn, Lang)

Medical Engineering (Eisenberg)

Systems Science, Networks, and Controls (Kyriakopoulos, Lee, Meltzer)

sion

lition to the School of Engineering and Applied Science requirements for sion to graduate study toward the Doctor of Science degree (see page pplicants for the Doctor of Science degree in the Department of cal Engineering and Computer Science must meet the following general ecific requirements.

AL REQUIREMENTS

he applicant must be recommended for admission by the Chairman of partment of Electrical Engineering and Computer Science.

he applicant must have a minimum quality-point index of 3.20 (on a f 4.00 maximum), or equivalent, in graduate course work leading to the s degree.

he applicant must be adequately prepared in the basic sciences (physics, emistry or biology) and in mathematics (calculus through differential ns).

SPECIFIC REQUIREMENTS

In addition to the above general requirements, the applicant must also satis
through previous studies the following specific requirements according to th
area of concentration (major area):

Communications

Nine semester hours of statistical theory of communication and 3 semest
hours of information theory—EE 204, 241, 243, and 244; or equivalent.

Computer Heuristics, Modeling, and Numerical Methods

Twelve semester hours of numerical methods at the graduate level—CSc
201, 223, 281, and 282; or equivalent.

Computer Science

Twelve semester hours of computer system design and software beyond th
use of a compiler language—CSci 201, 202, 213, and 214; or equivalent.

Electrophysics

Twelve semester hours of electronics and electromagnetic fields and waves a
the graduate level—EE 201, 206, 207, and 221; or equivalent.

Medical Engineering

Twelve semester hours of medical engineering at the graduate level—BE
281, 282, 283, and 284; or equivalent.

Systems Science, Networks, and Controls

Twelve semester hours in network system analysis at the graduate level, in
cluding a knowledge of state space and linear graph theory—EE 201, 202, 20
and 273; or equivalent.

An applicant who fails to meet the above specific requirements, but meets
all other admission requirements, may be admitted with a program of stud
which is increased beyond the minimum requirements so that sufficient back
ground material may be covered for doctoral studies.

Program of Study

At the time of admission, the graduate student in pursuit of a Doctor of
Science degree in the Department of Electrical Engineering and Computer
Science is assigned a faculty adviser in the major area of study. In consulta
tion with the adviser, the student will determine the two minor areas of study
and the foreign language important in the student's field of study. Together
they will formulate a program of study for the student leading to the Qualify
ing Examination and complete the form "Graduate Program of Study"
(Form 1). Programs of study and any subsequent changes must be approved
by both the faculty adviser and Department chairman.

MAJOR AREA

The program of studies for the Doctor of Science degree will normally consist
of one major area of concentration and two minor areas totaling a minimum
of 30 semester hours of graduate-level courses (200 and above) beyond the
Master's degree level. A minimum of 15 semester hours must be taken in the

area; a minimum of three courses designated with an asterisk in the areas of concentration must be included as part of the major area. A who is changing the major area from that studied for the Master's de- or who is missing specific admission requirements may be required to take onal courses to make up deficiencies. Such additional work should not ally exceed 12 semester hours.

R AREAS

udent in consultation with the faculty adviser formulates a program of which includes two minor areas as part of the total doctoral studies. For students who take their minor area studies within the Department of ical Engineering and Computer Science, the following courses specify ate programs in each minor area:

nmications
4; 205 or 241; 243; and 244 or 249

ter Heuristics, Modeling, and Numerical Methods
23, 281, 282, and 285

ter Science
01, 202, 213, and 214 or 237 or 263

physics
, 206, 207, and 221

Conversion, Power, and Transmission
, 261, 264, and 265

Engineering
, 282, 283, and 284

Science, Networks, and Controls
, 203, 212, and 273

r areas are not confined to the Department of Electrical Engineering mputer Science, but may be taken from other departments within the ty such as Mathematics, Statistics, Operations Research, and Physics. y a minimum of three graduate-level courses constitutes a minor area.

YING EXAMINATION

alifying Examination for doctoral students in the Department is com- two parts. All incoming doctoral students must pass the first exam- within five semesters of their entrance. This first examination is the ent's Master's Comprehensive Examination (MCE) in the major area. ent must demonstrate superior performance to qualify formally as a stu- he Department at the doctoral level. Students with an M.S. degree from artment who continue with the same major area into doctoral work and demonstrated superior performance on the MCE have the requirement irst examination waived. A student may take the MCE only two times. o show superior performance on the MCE in the major field will result ation of the student's candidacy.

Upon completion of the student's formal program of study and after dem onstrating superior performance on the MCE and passing the foreign languag examination, the student is prepared to complete the Qualifying Examination The purpose of this second part of the Qualifying Examination is to ascertai that the student's depth and breadth of background and intellectual develop ment are adequate to support doctoral research and investigation in the majo area.

This second portion of the Qualifying Examination is comprised of a writ ten part covering the major area (one day) and each minor area (one day each). In addition and subsequent to the written examination, there may be an oral examination. The student must pass the entire second part of the Qual ifying Examination. A candidate who fails any portion of the Examination on the first attempt may take those portions of the Examination one more time if approval is given by the appropriate examining committee. Failure to pass the Qualifying Examination will terminate the student's candidacy in the doctoral program.

The questions on the Qualifying Examination are not limited to those spe cific areas in which the student has taken course work, but are designed to demonstrate the student's ability to integrate the material from several course areas as well as from individual study and readings. Hence, the student should be familiar with the contemporary work of the current journals and the con tents of the books on the particular reading lists in the areas of examination as well as those used in the course work.

Electrical Engineering Graduate Courses

201 Natural Modes and Transients in Electrical Systems (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sam pling. Prerequisite: graduate status. (Fall and spring—evening)

202 Linear System Theory I (3)

Graph theory and its application to networks and systems; system descrip tion in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computa solutions of the state equations; transient and steady-state response. Pre requisite: graduate status. (Fall—evening)

203 Linear System Theory II (3)

System properties; controlability and observability of linear systems; sen sitivity and stability analyses. Irreducible realizations of rational transfer function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202. (Spring—evening)

204 Stochastic Signals and Noise (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear mean-squared estimation; stationary estimation, stationary random pro cesses, correlation functions, power spectrum; output of linear systems with stochastic inputs; Gaussian processes. Applications drawn from com munications, control theory, computer science. (Fall and spring—eve ning)

205 Stochastic Processes in Electrical Engineering (3)

Markov chains, state classification, Kolmogorov equation; applications to probabilistic finite-state machines. Birth-death process, applications to queuing theory, buffer problems, and the design of communication nets. Continuous state processes, diffusion processes, passage times, and estimation problems. Estimation and power spectra. Stochastic difference and differential equations. Applications to communication theory, control theory, computer science, and propagation theory of random media. Prerequisite: EE 204 or equivalent. (Spring—evening)

206 Electromagnetic Theory and Applications I (3)

Brief review of vector-phasors and Maxwell's equations, electromagnetic potentials, power and energy; plane waves, frustrated total reflection, skin effect, anisotropic media; solution of radiation problems in the Kirchoff approximation: elementary applications. Prerequisite: EE 133 or equivalent. (Fall—evening)

207 Electromagnetic Theory and Applications II (3)

Introduction to advanced techniques for problems in electromagnetics; leaky waves and complex wave-types, stationary phase and steepest descent approximations for integrals in the complex plane. Discrete and continuous spectra. Application to optical fibers, surface and leaky wave antennas, ground wave propagation. Prerequisite: EE 201 or equivalent, EE 206. (Spring—evening)

2 Advanced Network Analysis (3)

Network theorems, network functions, relationship of parts of network functions; network properties, realizability and causality concepts; computer-aided network analysis. Prerequisite: EE 201, 202; or equivalent. (Spring, odd years—evening)

3 Computer-aided Analysis and Design of Networks (3)

Description and use of network analysis programs such as ECAP, CORNAP, and NASAP. Algorithmic methods for time and frequency domain analysis of networks using a digital computer, numerical solution of state equations, fast Fourier transform, network design by optimizing searches on digital computers, synthesis of electrical networks using unconstrained optimization techniques in the time domain, network design through approximation such as Fourier series, Chebyscheff functions, and Padé approximation. Prerequisite: EE 51, 212. (Fall, odd years—evening)

Linear Network Synthesis I (3)

Properties and testing of positive real functions. Synthesis of LC, RL, RC one-port networks. Brune, Bott-Duffin, Miyata, Kuh, and Darlington synthesis techniques. Introduction to two-port ladder and lattice synthesis. Three-terminal RC network synthesis approximation in the frequency and time domains. Prerequisite: EE 202 or permission of instructor. (Fall, even years—evening)

Linear Network Synthesis II (3)

Advanced topics in passive one-port and two-port synthesis. Introduction to n-port synthesis. Active network synthesis using negative resistance, controlled sources, NIC, gyrator, operational amplifiers, and circulators. Synthesis of distributed integrated networks. Computer-aided network optimization. Prerequisite: EE 215. (Spring, odd years—evening)

221 Physical Electronics I (3)

Theoretical principles underlying the operation of electronic devices; cl sical mechanics and classical statistical mechanics, the quantum theor wave and matrix mechanics, quantum statistics. Prerequisite: EE 207 o equivalent. (Fall—evening)

222 Physical Electronics II (3)

The Boltzmann transport equation, band theory of solids, time-depende perturbation theory, group theory. Applications to semiconductor an other solid-state devices such as transistors, tunnel diodes, masers, an lasers. Prerequisite: EE 221. (Spring—evening)

223 Optical Communications Systems (3)

Optical communication channels; survey of laser sources; modulatio line-of-sight links; system models and analysis; detection, photoemitter photodiodes, and photoconductors; noise mechanisms and signal-to-noi analysis; optical fiber waveguides, electromagnetic field description o material, waveguide, and modal dispersion; optic fiber cabling, repeater and systems analysis; integrated optic components. Prerequisite: EE 20 243. (Spring—evening)

224 Electronics of Lasers (3)

Basic concepts from quantum mechanics; Einstein coefficients; inversio and pumping mechanisms; rate equations. Resonators, He-Ne laser; op ganic dye lasers; injection lasers. Nonlinear interactions in lasers. Pre requisite: EE 222 or equivalent. (Fall, even years—evening)

225 Nonlinear Electronics (3)

Analysis and design of electronic components and systems operating a switching, sweeping, gating, and pulse generators; study of multivibrators negative resistance devices and amplifiers, nonlinear operation of oscilla tors. Prerequisite: EE 201 or equivalent. (Fall—evening)

226 Fiber and Integrated Optics (3)

Single-mode and multimode propagation in stepped-index and gradient index optical fibers: scattering and attenuation characteristics of fibers phase velocity, group velocity, impulse response, energy transport, ra tracing, Goos-Haenchen shift, Hamiltonian formalism; directional coup lers, modulators, and deflectors in fibers and surface films; coupled-mod theory. Prerequisite: EE 223 or equivalent. (Spring, odd years evening)

227 Industrial Electronics (3)

Applications of electronic devices in industry; continuous and sampl control systems; induction and dielectric heating; timing and counting circuits; reliability and automatic checking equipment; digital control o machine tools. Prerequisite: EE 201 or equivalent; and graduate stand (Spring, odd years—evening)

228 High-frequency Electronics (3)

Design and analysis of the operation of electron-tube, solid-state, crossed field, space-charge wave, and quantum maser oscillators and amplifying devices that lay the foundation of modern communication systems. Pre requisite: EE 207 or equivalent. (Spring—evening)

231 **Field Analysis and Potential Theory** (3)

General study of the theory of potentials as used to facilitate solution of problems in electromagnetic theory, mechanics, thermodynamics, optics, and gravitation. Emphasis on mathematical methods such as Green's functions, variational methods, principal axis transformations, and multi-dimensional Fourier transforms. **Prerequisite: EE 207. (Fall, even years—evening)**

232 **Electrodynamics** (3)

Special theory of relativity and the Lorentz transformation; Minkowski formulation. Maxwell's equations in the context of special relativity, electromagnetic potentials, and stress tensors. Lagrangian and Hamiltonian formulations, radiation from moving charges. Introduction to quantum electrodynamics. **Prerequisite: EE 207. (Spring, even years—evening)**

33 **Microwaves and Components** (3)

High-frequency transmission lines and guided systems; matching techniques; scatter ferrite isolators, gyrators; Faraday rotation; microwave networks; directional couplers; cavity resonators and microwave components. **Prerequisite: EE 207. (Fall—evening)**

4 **Electromagnetic Wave Propagation** (3)

Retarded time scalar, vector, and Hertz potential. Dipole and dipole array fields; Mie theory of electromagnetic scattering by spheres. Propagation in electrically and magnetically anisotropic media such as dielectric crystals, space-charge plasmas, and ferrites. Wave propagation in inhomogeneous media; Liouville transformation, Lagrange's variation of parameters, WKB solution, invariant imbedding techniques. Propagation in stochastic and dispersive media. **Prerequisite: EE 207. (Fall, odd years—evening)**

Antennas (3)

General solution of Maxwell's equations in terms of current sources, the far field approximations, radiation from current distributions, field equivalence theorems, the geometrical optics approximation, aperture antennas, receiving antennas, the theory of arrays, and applications to specific antennas and antenna types. **Prerequisite: EE 207. (Spring—evening)**

Plasma Dynamics (3)

Study of the interaction of fluids with electromagnetic fields. Generalized Navier-Stokes and energy equations, magnetogasdynamic and magnetohydrodynamic approximations, boundary-layer theory, statistical theory of turbulence, generalized Von Karman-Howarth equation, Boltzmann transport equation. MHD generators and devices. **Prerequisite: EE 207. (Spring, even years—evening)**

Waves in Random Media (3)

Propagation and scattering of electromagnetic, optical, and acoustic waves in random media, scattering from rough surfaces and randomly distributed particles, turbulence. Applications to propagation through rain and fog. Laser beam scintillations, remote sensing, and communication channel modeling. Computer simulation by Monte Carlo techniques. **Prerequisite: EE 204, 207. (Fall, odd years—evening)**

241 **Information Theory** (3)
Measure of information, noiseless coding; communication channels, chan
nel capacity, the noisy channel coding theorem; bounds on the perform
ance of communication system; the Gaussian and binary symmetric chan
nel; feedback communications systems; rate-distortion theory. Prerequi
site: EE 204. (Fall—evening)

242 **Coding Theory** (3)
The PCM Communication System, mathematics of coding; groups, rings
and fields; linear codes: parity and generator matrices, syndromes error
correction and deletion capability, minimum distance; performance bounds
of linear codes, Hamming and Golay codes, polynomial algebras and
Galois fields, shift-register implementation; cyclic codes: implementation
and performance; BCH codes: encoding, decoding, minimum distance,
the BCH decoding algorithm, burst-correction codes, convolutional codes,
sequential and Viterbi decoding of convolutional codes. (Spring—
evening)

243 **Communication Theory I** (3)
Optimum receivers for vector channels and for the additive white Gaus
sian noise channel; correlation detectors, matched filters; coherent and
noncoherent detection and their error probabilities for simplex, orthogo
nal, and coded systems; bounds on the performance of communications
in Gaussian noise; comparison of communications systems. Prerequisite:
EE 204 or equivalent. (Fall—evening)

244 **Communication Theory II** (3)
Schemes for efficient signaling for data sequences; effects of quantizing
at the receiver. Practical implementation of orthogonal and simplex
coded communication. Convolutional codes; bounds on performance de
coding by sequential (Zigangirov-Jelinek, Fano) and MAP (Viterbi)
algorithms. Fading and dispersive channels, diversity techniques and
their performance. Topics from analog communications. Prerequisite:
EE 243. (Spring—day and evening)

245 **Signal Detection and Estimation Theory** (3)
Statistical detection theory, hypothesis testing, sequential detection, estima
tion theory, maximum likelihood and Bayes methods, estimation of signal
parameters and continuous wave forms, Wiener and Kalman filters, appli
cations to the design of optimum receivers, adaptive systems. Prerequisite:
EE 241, 244; or equivalent. (Fall—evening)

246 **Digital Communications** (3)
Digital transmission for data, voice, and video. Modern practice in data
communication; voice digitization, PCM, delta modulation, linear pre
dictive coding. Bounds for digital signaling, pulse dispersion and inter
symbol interference. Nyquist criteria, eye openings; adaptive equalizers
decision feedback, partial response techniques. Regenerative repeaters
timing extraction, synchronization and jitter. Transmission codes. Multi
plexing and framing. Error control for data. Digital switching and inte
grated digital networks. Topics from spread spectrum and secure com
munications. Prerequisites: EE 241, 244 or equivalent. (Spring—eve
ning)

247 **Communication Systems** (3)
Phase-locked loop dynamics noise behavior and optimization. Parameter
estimation theory and Wiener filters with application to optimum demod

lation of analog waveforms (DSB-AM, SSB-AM, FM). Partially coherent digital demodulation. Comparative analysis of modulation systems. Frequency acquisition and synchronization. Selected topics in channel impairments and multiple access. Prerequisite: EE 241, 244. (Fall—evening)

249 **Data Telecommunication Networks** (3)

Design and analysis of computer-communication and terminal-oriented data networks. Line, message, and packet switching. Traffic theory for data. Queuing models for store and forward data communications. Optimization for minimum message delay and cost. Statistical multiplexors (concentrators), topological design problems, and algorithms; network control and protocols. Prerequisite: EE 205 or equivalent. (Fall—evening)

250 **Telecommunication Systems Concepts** (3)

Essential elements of an electrical communication system, speech, TV, and data signals; spectrum, bandwidth, sampling. Amplitude, frequency, and pulse code modulation and comparative performance. Multiplexing schemes, communication quality standards, and objectives. Signal power, noise power, distortion, and channel capacity. Probability, traffic theory, reliability, voice, TV, and data transmission. Telecommunication, microwave radio, cable, and satellite communications systems. (As arranged)

251 **Survey of Telecommunication Systems** (3)

Design of a communications link for voice, TV, and data. Loading; the switched telephone network. Transmission system layout and major design considerations. Overall system design of microwave radio system. Radiowave propagation fundamentals. Satellite communications, factors affecting the choice of orbit and orbital separation of satellites, satellite transponder. Major design consideration and values of significant parameters for a typical satellite communications link. Overall design of a cable communication system. Digital transmission and terminals. Wideband data transmission. Frequency allocation. (As arranged)

252 **Digital Signal Processing Techniques** (3)

Digital signal processing and data reduction techniques; applications to communications, controls, image enhancement, radar, and speech processing. Least-squares fitting of polynomials; sampling and quantization. Recursive and nonrecursive digital filter design. Generation and shaping of pseudo-random noise. Estimation of correlation functions and spectral densities. Digital processing for Kalman-Bucy filters. Extraction of signals and timing from noise. Fast Fourier and Hadamard transforms. Software and hardware implementation of signal processing algorithms. Prerequisite: EE 51 or equivalent; EE 204; and graduate status. (Fall—evening)

253 **Sonar Systems** (3)

Underwater sound propagation; transducer and transducer arrays; detection, localization, and tracking techniques; array processing; time compression correlation and digital processing of signals; effects of nonhomogeneous noise fields; applications to navigation and communications in the ocean environment. Prerequisite: EE 204. (Fall—evening)

250 and 251 cannot be applied toward a graduate degree in the School of Engineering and of Science.

254 **Radar Systems** (3)

The radar equation, range and resolution limits; MTI radars; detection a estimation techniques; clutter characteristics and detection in clutter; sig design; ambiguity functions; Doppler radar; phased arrays; synthetic ap ture techniques; digital and optical processing and computer control. A plications. Prerequisite: EE 206, 244. (Spring—evening)

255 **Optical Processing** (3)

Fourier transforms by diffraction of light, optical spectrum analysis, op cal memories and systems, holography and holographic techniques, prop erties and techniques for photographic reproduction. Prerequisite: EE 20 (Fall—evening)

256 **Environmental Optics** (3)

Distribution of radiation: power converting and transferring systems; UV luminous, IR spectral sources; daylight; moonlight; luminaries. Environ mental boundaries—transmission, reflection, diffusion, refraction, diffrac tion, dispersion, bleaching, phototropy, polarization. Simulation of organ ismic responses: response definition—physiological, overt behavioral, per ceptual, cognitive. Stimulus-response correlation model; correlating meas urement concepts. (Spring—evening)

257 **Issues in Computer Communications** (3)

Fundamentals of data communications, systems, integrating computer and telecommunications, modems, multiplexers, concentrators and lines. Networks of computers: distributed and centralized. Network organiza tion: circuit-switched, store-and-forward, and packet-switched. System de sign considerations; management factors; economic and regulatory issues; changes in technology; effect on systems cost performance; regulation; value-added networks. (Spring—evening)

258 **Radio Communication Systems I** (3)

Analysis and design of microwave communication systems for terrestrial, satellite, and over-the-horizon scatter radio channels. Propagation effects and channel characterization including refraction, reflection, multipath, scattering, and absorption. Effects of earth curvature and characteristics of over-land and over-water propagation. Antenna considerations including gain, directivity, polarization, and antenna patterns. Frequency and time-division multiplexing and modulation techniques. Effects of noise, interference, and fading. Diversity techniques. Prerequisite: EE 206, 244. (Fall—evening)

259 **Radio Communication Systems II** (3)

Morphology of the ionosphere, propagation of ionspherically reflected radiowaves, anomalous ionospheric propagation mechanisms, linear an tenna structures, atmospheric noise, digital modulation techniques, Gaussian channel performance, diversity, fading channel error control, typical VLF, LF, and HF system design. Prerequisite: EE 258 or permis sion of instructor. (Spring—evening)

261 **Electromechanical Energy Conversion** (3)

Characteristics of synchronous machines, synchronous reactance, reaction theories, synchronizing generators and parallel operation of machines, characteristics of asynchronous machines, machines as circuit elements, steady-state and dynamic performance of alternating current machines. (Fall—evening)

264 **Direct Electrical Energy Conversion** (3)

Theory and practice for direct production of electricity using solar cells, thermionic converters, fuel cells, and batteries. Concepts of solid state energy bands, work function and conversion efficiency, and limitations. (Spring—evening)

265 **Electrical Power Production** (3)

Production of electrical power from primary energy sources. Use of hydrocarbon fuels in the production of steam; hydroelectric generation and tidal variations as primary energy. Geothermal energy, nuclear fission, magnetohydrodynamics, fusion and solar concentrators as primary energy sources. (Fall, odd years—evening)

266 **Electrical Power Transmission and Distribution** (3)

Transmission line characteristics, exact and approximate equivalent circuits; line configurations; standing waves, filtering and protection, high voltage lines; equivalent circuits of transformers, line losses, substation design, d.c. transmission, distribution systems. (Spring, even years—evening)

267 **Power Networks** (3)

Symmetrical components, short and opened circuit analysis of power networks, stability of electrical grids, fault analysis, network reliability, frequency control, load flow analysis. Prerequisite: EE 266. (Fall, even years—evening)

269 **Issues in Electrical Power Systems** (3)

Load flow analysis of large power networks, economic considerations on network topology; optimal network layout; rate structures, cost of primary energy, plant locations, environmental considerations in network design and operation. (Spring, odd years—evening)

272 **Discrete Systems** (3)

Sampling processes and theorems; Z-transforms and modified Z-transforms; responses of discrete systems using transformation techniques and state equations; stability criteria; design of digital controller for discrete systems. Prerequisite: EE 203 or equivalent. (Spring, even years—evening)

273 **System Optimization** (3)

Parameter optimization problems; theory of minima and maxima. Optimization problems for dynamic systems; calculus of variations; the maximum principle and the Hamilton-Jacobi equation. Optimization problems with constraints; optimal feedback systems. Numerical solution of optimal problems. Prerequisite: EE 203 or equivalent. (Fall—evening)

274 **Nonlinear Systems** (3)

Definition of linear and nonlinear systems; introduction to approximate analysis of nonlinear systems—describing functions, Krylov and Bogoliubov's asymptotical method and Tsypkin's locus. Forced oscillations—jump resonance. Stability analysis—Liapunov's criterion, Luré's problem, and Popov's method. Prerequisite: EE 203. (Spring, odd years—evening)

275 **System Identification and Adaptive Systems** (3)

Introduction to the adaptive problem and practical applications. Determining the mathematical representation of systems—the identification problem. Optimal estimation of states in the presence of uncertainties. Adaptive systems. Prerequisite: EE 203, 204; or equivalent. (Fall, even years—evening)

276 **Cybernetics** (3)

Principles of machines or mechanisms made by men or nature with reg
to their ways and forms of possible behaviors: regular, determinate,
reproducible; fundamental concepts of finite differences; changes
transformations as sets of transitions, leading to stability and feedba
statistical concepts of complex systems and blackbox theory; Shanno
information theory; regulation and control of mechanisms. Prerequisi
EE 204 or equivalent. (Fall, odd years—evening)

277 **Space Communication Systems** (3)

Theoretical and application aspects of space communications, as relat
to communication satellite systems, scientific satellites, manned spa
missions, and deep space missions. Prerequisite: EE 244. (Fall—
evening)

278 **Spacecraft Systems Design** (3)

Space environment; structure, propulsion, control, and instrumentation o
spacecraft—launch, orbit, transit, and re-entry problems; bioastronauti
considerations. Prerequisite: graduate status. (Spring, even years—
evening)

281 **Medical Instrumentation I** (3)

Theory of measurements in biological areas, techniques for electroni
measurements on biological specimens, current problems in medical ins
trology stressing electronic systems. Prerequisite: EE 283 or permissio
of instructor. (Fall—evening)

282 **Medical Instrumentation II** (3)

Medical telemetry systems, medical use of the computer, engineering tech
niques in patient treatment, principles of good medical instrumentation.
Prerequisite: EE 283 or permission of instructor. (Spring—evening

283 **Introduction to Medicine for Engineers I: Physiology and Anatomy** (3)

Designed to acquaint the engineering student with the physiology of the
human body; material based on the curriculum of the School of Medicine
and taught from a systems viewpoint; concepts of cellular structure and
function integrated into the tissue and organs, which are then related to
the various systems of the body; interrelationships of the body systems,
i.e., the interaction of the nervous system with the musculoskeletal sys
tem or the interaction of the respiratory system and its functions with the
cardiovascular system. (Fall—evening)

284 **Introduction to Medicine for Engineers II: Clinical Medicine** (3)

Clinical aspects of medicine. Further elaboration of physiological
tems, such as the endocrine system, renal physiology, gastrointestinal
physiology, and others; the separate systems of the body are integrated to
present the functioning of the body as an overall system; considerable
interaction with physicians and other medical personnel. Prerequisite EE
283. (Spring—day)

285 **Engineering in Physical Medicine and Rehabilitation** (3)

Application of engineering theory and techniques to the rehabilitation of
handicapped persons; major problem areas and general approaches, as
as specific solutions. Offered cooperatively with personnel from the
and Rehabilitation Services Administration. Prerequisite: EE 284
(Spring, odd years—evening)

286 **Sensory-evoked Potentials I** (3)
Physiological significance of the sensory-evoked potential, stimulation variables, subject variables, data acquisition procedures and instrumentation, signal-averaging computers, analysis techniques for the VEP, applications of the VEP. Lectures, discussion, and laboratory. Prerequisite: EE 281, 282, 283, 284; or permission of instructor. (Fall—evening)

287 **Computer-aided Analysis of Physiological Signals** (3)
Computer analysis of physiological data obtained from the cardiovascular, pulmonary, and nervous systems. Sources and detection of various signals obtained from these systems; algorithmic techniques applicable to the analysis of these signals; students, provided with real data obtained from hospital patients, are required to develop computer software for determining pertinent medical parameters as established by physicians. Prerequisite: EE 281, 282, 283, 284; and a working knowledge of FORTRAN. (Spring, odd years—evening)

288 **Physiological Controls and Systems** (3)
Some applications of control and systems theory in the medical and biological fields. Application of general control and systems theory as applied to physiological systems. Specific applications of control and systems theory to the visual system, respiratory system, cardiovascular system, and musculoskeletal system. Prerequisite: EE 172 or equivalent; EE 281, 282, 283, 284. (Spring, even years—evening)

289 **Clinical Engineering** (3)
A cross-sectional view of clinical engineering applications, functions, variations, and patterns in the medical and allied health care area. Use of instrumentation, computers, and systems by clinical engineers in hospitals and clinics. The clinical engineer in cardiovascular measurement systems and intensive care units; other areas where functional usage of clinical engineering is applicable. Prerequisite: EE 281, 282, 283. (Fall, even years—evening)

298 **Research** (arr.)
Research as arranged. May be repeated for credit. (Fall and spring)

300 **Thesis Research** (3–3)
(Fall and spring)

319 **Systems Science, Networks, and Controls Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

323 **Principles of Microelectronics** (3)
Basic principles, techniques, and processes necessary for understanding microelectronics. Semiconductor physics, phase diagrams, crystal growth, epitaxy, vacuum techniques, thin-film deposition, diffusion, oxidation, junction formation, masking, and properties of thin films and materials. Prerequisite: EE 222 or equivalent. (Fall, odd years—evening)

329 **Electrophysics Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

345 **Advanced Detection Theory** (3)
Review of general estimation equations. Linear estimation; Weiner and Kalman-Bucy filters; nonlinear modulation theory; angle-modulation sys-

tems, analysis and design of phase-lock loops, optimum angle-modulatio
rate distortion theory; Gaussian processes in Gaussian noise, detection a
parameter estimation, canonical receivers, structures, and performance c
culations for diversity systems, multiple pulse radars, stationary process
and threshold receivers. Prerequisite: EE 245. (Spring—evening)

346 **Communications Switching and Traffic Theory** (3)
Switching network technology, step-by-step common control, stored pr
gram electronic switching systems. Traffic models. Engineering of mu
tiple server systems, analysis of graded multiples and multistage con
necting networks. Software issues, digital time division and store an
forward switches. Analytical bounds on the complexity of switch net
works, combined circuit and message switching. Current practice an
practical issues. Prerequisite: EE 243 or permission of instructor
(Spring, even years—evening)

347 **Data Communications** (3) (Same as CSci 244)
Principles and practice of modern data communications. Modes for dat
transmission; terminals, modems, multiplexors, concentrators. Line con
trol procedures. Protocols for buffer management, message reassembly
queue control. Distributed processing; terminal-oriented systems, data col
lection loops, multi-drop lines. Switched data systems; circuit and packe
switching. Error control, cryptosecurity. Hardware and software inter
facing. Prerequisities: EE 243 and CSci 201, 202, or permission of in
structor. (Fall—evening)

349 **Communications Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying exam
nation. May be repeated for credit. (Fall and spring)

371 **Simulation Methods for System Analysis** (3)
Survey of simulation languages. Techniques of model building for mate
rial- and machine-based systems. Treatment of these systems with netwo
of transactions and states. Modeling the dynamic processes of growth
problems. Analog, hybrid, and digital methods for simulation treated by
means of case studies; speed and cost of alternate computing procedures.
Project-type problems used to illustrate simulation methods. Prerequisites
CSci 278 or permission of instructor. (Fall, odd years—evening)

372 **Analysis and Control of Large Systems** (3)
Systems as multistage decision processes. Analytical concepts of model
making and matrix representations of large systems. Approximation by
models of lower dimension—reduction to simplified models; decentralized
systems. Differential games; computation of saddle points; construction of
an equilibrium point. Prerequisite: EE 273. (Spring, even years—eve
ning)

381 **Bioelectric Phenomena** (3)
Mathematical treatment of selected bioelectric phenomena. Membrane
thermodynamics; membrane electrical potentials and subthreshold mecha
brane effects; membrane dynamics. Solid-state phenomena in biology and
medicine. Photoconduction. Mechanism of nerve propagation. Electrical
models of the heart. Cell physiology. Quantum effects in biological sys
tems. Prerequisite: EE 206, 281, 282, 283. (Fall, odd years—evening)

386 **Sensory-evoked Potentials II** (3)
A continuation of EE 286. Advanced lecture, discussion, and laboratory.
Current topics in sensory-evoked potentials research; emphasis on clinical

applications. Planning and conducting an advanced (clinical or research) project chosen to take maximum advantage of the student's technical background from an instrumentation, computer, and data analysis viewpoint. Prerequisite: EE 286 and permission of instructor. (Fall, odd years—evening)

389 **Medical Engineering Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

Science Graduate Courses

201 **Introduction to Computer Systems I** (3)

Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine control and memory addressing. Characteristics of different computer structures and the programming of such machines. Introduction to structured programming, string processing, reclusion, and BNF. Characteristics and choice of data processing languages. Prerequisite: CSci or EE 51 or equivalent; assembly language programming experience; and permission of instructor. (Fall and spring—evening)

202 **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis and synthesis of switching circuits using Boolean algebra; minimization techniques in the design of logical circuits; number systems and arithmetic in digital computers, digital computer architecture and the design of functional sub-units; design of memory, arithmetic, and units comprising a digital computer; information flow, timing, and control in large digital computers. Prerequisite: CSci 201 or permission of instructor. (Spring—evening)

208 **Computer Programming** (3)

Use of a macroassembler in structured programming. Input-output programming at the assembly level. Conditional assembling, access methods, and storage management. Memory management and I/O buffer pools. Introduction to the operating system, job control language, file structures. Program status and control, interrupt handling, reentrant and recursive subroutines. Prerequisite: CSci or EE 158; or CSci 201; or permission of instructor. (Spring—evening)

213 **Discrete Structures in Computing** (3)

Introduction to discrete mathematical structures used in computing. Sets, graphs, functions, mappings, lattices, groups, and semigroups. Combinatorial problems and enumerations. Finite-state machines, representations, identification, transitions, and reductions. Directed graphs, trees, and paths through a program. Regular expressions and relations between programs and computing machines. Prerequisite: CSci 51 and permission of instructor. (Fall and spring—evening)

214 **Data Structures** (3)

Computer data structures; arrays, items, pointers, lists, insertion and deletion, available space management, threaded lists, two-way lists, garbage

collection and compactification. Push-down stacks, strings and files. Tr
structures and searching; hash table searches, bubble, radix, and mer
sorting. Sequential, index-sequential and random files; access method
sorting of files. Buffer pools and buffer management, data managemen
and storage. Prerequisite: CSci 158 or 201; 213. (Spring—evening)

216 Information Retrieval Systems (3)

Information organization and retrieval of natural language data by digi
computer systems; statistical, syntactic, and logical analysis of natural lan
guage used for retrieval systems; dictionary systems including thesauru
look-up and phrase structures; searching strategies and cataloguing. Inpu
preparation and output structures; large-scale file structures and operatin
systems required for their use. Prerequisite: CSci 214 and 227, or pe
mission of instructor. (Spring—evening)

219 Interactive Computer Graphics (3)

Display devices, CRT, point plotting and vector generation, character gen
erators; display files, data structures, linear and area transformations, clip
ping and windows; graphic input devices; interrupt handling; scaling; per
spective, projection, hidden line elimination; command languages, time-
shared interactive graphics, software support. Prerequisite: CSci 214 or
permission of instructor. (Fall—evening)

220 Pattern Recognition (3)

Applications of pattern recognition, vector spaces, estimation and samples;
Bayes estimation; density functions; stochastic approximation; decision rules
in pattern recognition, minimal risk, Gaussian filters; bounds of risk, near-
est-neighbor decision rules; clustering techniques, feature extraction, pat-
tern recognition with *a priori* knowledge. Prerequisite: EE 204, CSci 214.
(Spring—evening)

222 Design of User-Computer Dialogues (3)

Design of dialogues for interactive terminal systems, including graphic
systems. Psychological, physiological, linguistic, and perceptual factors.
Advantages and disadvantages of various interactive techniques, command
language syntaxes, and data presentations. Effect of operator training and
motivation. Case studies, research readings, and projects. Prerequisite:
CSci 214 or permission of instructor. (Spring—evening)

223 Simulation and Heuristics (3)

Techniques of deterministic and probabilistic simulation on the digital com
puter. Mathematics for simulation; design of systems modules; random
number generation and testing. Markovian and bounded context systems;
generation of stochastic variates; Monte Carlo techniques; heuristics: veri
fication techniques; simulation languages. Prerequisite: CSci or EE 158
or CSci 201; and permission of instructor. (Fall—evening)

224 Artificial Intelligence (3)

Survey of topics. Analogies and simple concepts. Symbol manipulation
and programming in LISP. Networks and simple learning. Scene analysis
and sentence analysis. Programming the BLOCKS world. Depth-first and
breadth-first searching, hill-climbing, network searching, min-max and
a-b pruning. Problem-solving systems. Prerequisite: CSci 214. (Spring
—evening)

227 Management Information Systems and Data Base Management (3)

Concepts in management information systems. Commercial programming
features of COBOL and PL/I. Inverted files and query systems. Buildings

report generation, updating, and updating load. Tradeoff between direct access and indexed-sequential access. Maintaining large programming systems which lead to the need for data base management systems; construction of data base management systems. Survey of some existing data base systems. Relational data base concepts and future developments. Students will create and update a data base and interface to application programs. Prerequisite: CSci 208, 214. (Fall—evening)

229 **Security and Privacy in Computer Systems** (3)

Techniques for security of data and programs in computer systems. Authentication methods, logging, authorization, encryption, problems of statistical inference. Effects of operating systems and machine architecture on security. Cost trade-offs among various countermeasures. Theoretical models. Related nonmechanical measures. Effect on system design of legal constraints on data banks. Current and potential legal constraints. Prerequisite: CSci 214 or equivalent. (Fall—evening)

232 **Automata Theory** (3)

Regular expressions including equality and transformations between sequential machines and regular expressions. Turing machines, recursive function, predicate calculus, and computability. Complexity of algorithms. Formal language theory including grammatical construction, recognizers, relationships between machines and grammars, and ambiguity. Random processes in sequential machines. Prerequisite: CSci 213. (Spring—evening)

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-speed arithmetic units. Random access and associative memories; rotational storage devices; computer control and interrupt structures. Input-output channels and interfacing problems. Communications in digital computers. Introduction to multiple-access and time-sharing systems. Prerequisite: CSci or EE 154; or CSci 202. (Fall—evening)

239 **Comparative Computer Systems** (3)

Structures of computers and a general language for system description. History of different computer structures. Development of the operating system. Special purpose processors. Multiprocessors and large computing systems. Computer networks and time-shared systems. Comparison of computer families. Characteristics and philosophies of computer design of the major manufacturers. Introduction to performance evaluation and measurement. Effects of software and technology on computer structures. Prerequisite: CSci 237, 263. (Spring—evening)

240 **Theory and Practice of Microprogramming** (3)

Basic concepts, techniques, and theory of microprogramming as applied to the implementation of control systems for sequential machines. Microprogramming languages, assemblers, and hardware simulators, including specific applications of these to the design of current computer systems and their interfaces with real-time systems. Prerequisite: CSci 237, 263. (Spring—evening)

243 **Fault Tolerant Systems and Design Automation** (3)

Fault test generation for combination and sequential circuits, digital simulation as a diagnostic tool, design of easily tested and fault tolerant systems. Physical packaging of digital circuits; design of circuit boards

including partitioning, placement, and interconnection of elements. P requisite: EE or CSci 153 or CSci 202. (Fall—evening)

244 **Data Communications** (3) (Same as EE 347)

Principles and practice of modern data communications. Modes for d transmission; terminals, modems, multiplexors, concentrators. Line co trol procedures. Protocols for buffer management, message reassembl queue control. Distributed processing; terminal-oriented systems, da collection loops, multi-drop lines. Switched data systems; circuit an packet switching. Error control, cryptosecurity. Hardware and softwar interfacing. Prerequisite: EE 243; CSci 201, 202 or permission of instruc tor. (Fall—evening)

245 **Advanced Computer Systems Theory I** (3)

Analytical models applied to computing systems. Determinance, deadl locks, concurrency, and synchronization of computer processes. Optima task scheduling using linear graph theory. Concurrent processes in multi processors. Analysis of the overlap of I/O and CPU processing. Queuing theory applied to time-shared computer models. Analysis of secondary storage devices and effective data rate. Analysis of memory buffer pools and multiprogrammed memory allocation. Memory allocation and stor age heirarchy operation and their effect on throughput and response time. Prerequisite: EE 204; CSci 237, 263. (Fall—evening)

246 **Advanced Computer Systems Theory II** (3)

Optimum secondary storage placement algorithms to improve throughput. Modeling of secondary storage operation and data staging. Analysis of memory allocation algorithms to improve system performance. Charac teristics of computer system hardware and software to provide for multi processing, multiprogramming, and time-shared operation. Loosely and tightly-coupled multiprocessors. Analysis of front-end processors in data base operation and computer networks. System analysis of a large, time shared, terminal-oriented transaction processing system. Prerequisite: CSci 245. (Spring—evening)

255 **Formal Languages, Correctness, and Structured Programming** (3)

Introduction to formal computer languages. Structured programming and block-oriented languages. Regular, context-free, context-sensitive, and unrestricted computer grammars. Parsing a language, syntax of languages, pushdown automata and their use in compiling. Top-down structured programming. Avoidance of GO TO statements. Correctness, termination, and equivalence of programs. The inductive assertion method. Termination methods based on well-ordered sets. Assertion languages, program schemes, fixed point methods, and inductive principles. Prerequisite: CSci 214. (Fall—evening)

256 **Design of Translators** (3)

Design of procedure-oriented computer languages. Semantics and pragmatics as they affect the design of translators, interpreters, and compilers. Top-down and bottom-up recognizers. Production of machine code. Syntax-directed compiling. Tables and their organizations in translators. Optimizing compilers; compiler-compilers. Prerequisite: CSci 214. (Spring—evening)

258 **Advanced Programming Languages** (3)

Recent developments in programming language research. Modern data structuring concepts such as abstract data structures, access control, co

reliability, and structuring of data in special-purpose languages. Language extensibility. Machine-independent design of language processors. Case studies will include Snobol 4, Pascal, and advanced concepts in PL/I. Students' projects will emphasize applications of these languages and concepts. Prerequisite: CSci 214 and permission of instructor. (Spring—evening)

263 **Digital Computer Programming Systems** (3)

Design of computer systems software. Design and programming of an assembler and loader. Multiprogrammed job control including linking, loading, linkage-edit, relocatability, region size, and status switching. Design of dispatchers and monitors. Design of utility programs. Input-output programming and control. Communications among components of the operating system. Prerequisite: CSci 208, 214. (Fall—evening)

267 **Operating Systems I** (3)

Introduction to the operating system for batch-operated multiprogrammed computer systems. Software components which constitute the operating system. Facilities of the macro-assembler which utilize the operating system; loading and linking routines; initializing programs and tasks; dispatching and the interrupt mechanisms. Memory management in fixed and variable partitions; device and storage management. Input-output control and use of access methods. Performance evaluation of a multiprogrammed batch-operated system. Prerequisite: CSci 263. (Fall—evening)

268 **Operating Systems II** (3)

Introduction to operating systems for time-shared and multiprocessor computer systems. Processor management in a multiprocessor system; deadlocks, processor utilization, and I/O management. System availability and fail-soft mechanisms. Time-slicing and time-sharing operating systems and subsystems; transaction processing subsystems; memory management in a paged and segmented virtual memory system. Performance of the operating system. Computer network software and an introduction to the computer as a utility. System security and large data base systems. Prerequisite: CSci 267. (Spring—evening)

271 **Analog and Hybrid Computers** (3)

Analog computer components and electronics. Slow analog computer solutions of linear and nonlinear differential equations. System simulation and modeling on the analog computer. Introduction to the iterative analog computer. Transfer function simulation and use in control theory. The hybrid computer, digital logic, and digital computer control. Digital-to-analog and analog-to-digital converters and interfaces. Optimization methods on a hybrid computer. Parameter variations and searching methods. Prerequisite or concurrent registration: CSci or EE 154; or CSci 202; or permission of instructor. (Fall—evening)

281 **Applications of Numerical Methods I** (3)

Basic numerical methods with emphasis on their application to engineering problems. Error sources and error control; numerical representation of functions; over-determined systems; eigenvalues and eigenvectors; introduction to nonlinear equations; initial value and boundary value problems for ordinary differential equations. Theoretical concepts such as order of accuracy, Richardson's extrapolation, norm, stability, and convergence. Some modern methods such as spline approximation and the QR algorithm for eigenvalues. (Fall—evening)

282 Applications of Numerical Methods II (3)

A continuation of CSci 281. Systems of nonlinear equations; numeri optimization; numerical solution of common partial differential equati of engineering; methods for hyperbolic, parabolic, and elliptic proble introduction to finite element methods. Prerequisite: CSci 281. (Spring—evening)

*285 **Approximation of Functions and Data Representations** (3)

Review of linear spaces; least squares, orthogonal functions; nonlin techniques, gradient search methods; parameter estimation with discre data; Tchebysheff approximation; approximation and curve fitting spline functions and Bernstein polynomials. Prerequisite: CSci 281. (Fall—evening)

286 **Numerical Methods in Engineering I** (3)

Computational methods for solution of systems of linear algebraic equa tions and for the solution of the algebraic eigenvalue problem. Empha on accuracy and efficiency. Methods for banded and other sparse sy tems. Methods for parallel and pipeline processer computers. Prereq site: CSci 281 and knowledge of linear algebra. (Spring—evening)

287 **Numerical Methods in Engineering II** (3)

Computational methods for solution of systems of ordinary differential equations: single-step methods, general multistep methods; convergence and stability analysis, methods for stiff equations, step size control and control of order. Prerequisite: CSci 281 and knowledge of differential equations. (Spring—evening)

288 **Numerical Methods in Engineering III** (3)

Computational methods for solution of boundary value problems in ordinary and partial differential equations: shooting methods, finite ference methods, functional approximation methods. invariant imbedding method of lines, treatment of boundaries in multidimensional problems. Prerequisite: CSci 282 and knowledge of differential equations. (Fall —evening)

289 **Numerical Methods in Engineering IV** (3)

Computational methods for solution of initial value problems for partial differential equations: method of lines, consistency, stability, convergence, explicit and implicit finite difference methods, alternating direction methods, high-order methods. Prerequisite: CSci 282 and knowledge of partial differential equations. (Fall—evening)

298 **Research** (arr.)

Research as arranged. May be repeated for credit. (Fall and spring)

299–300 **Thesis Research** (3–3)

(Fall and spring)

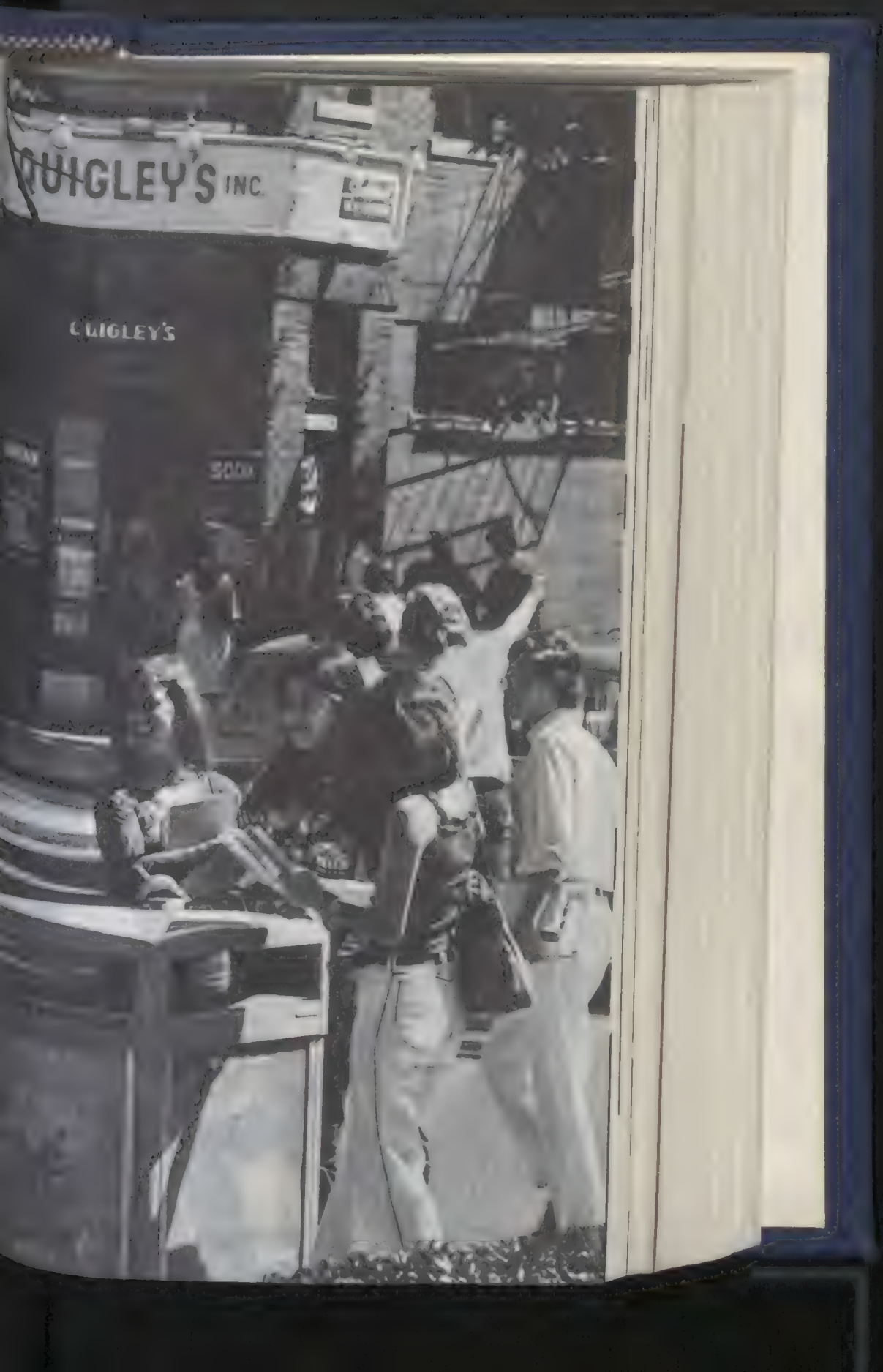
391 **Computer Science Research** (arr.)

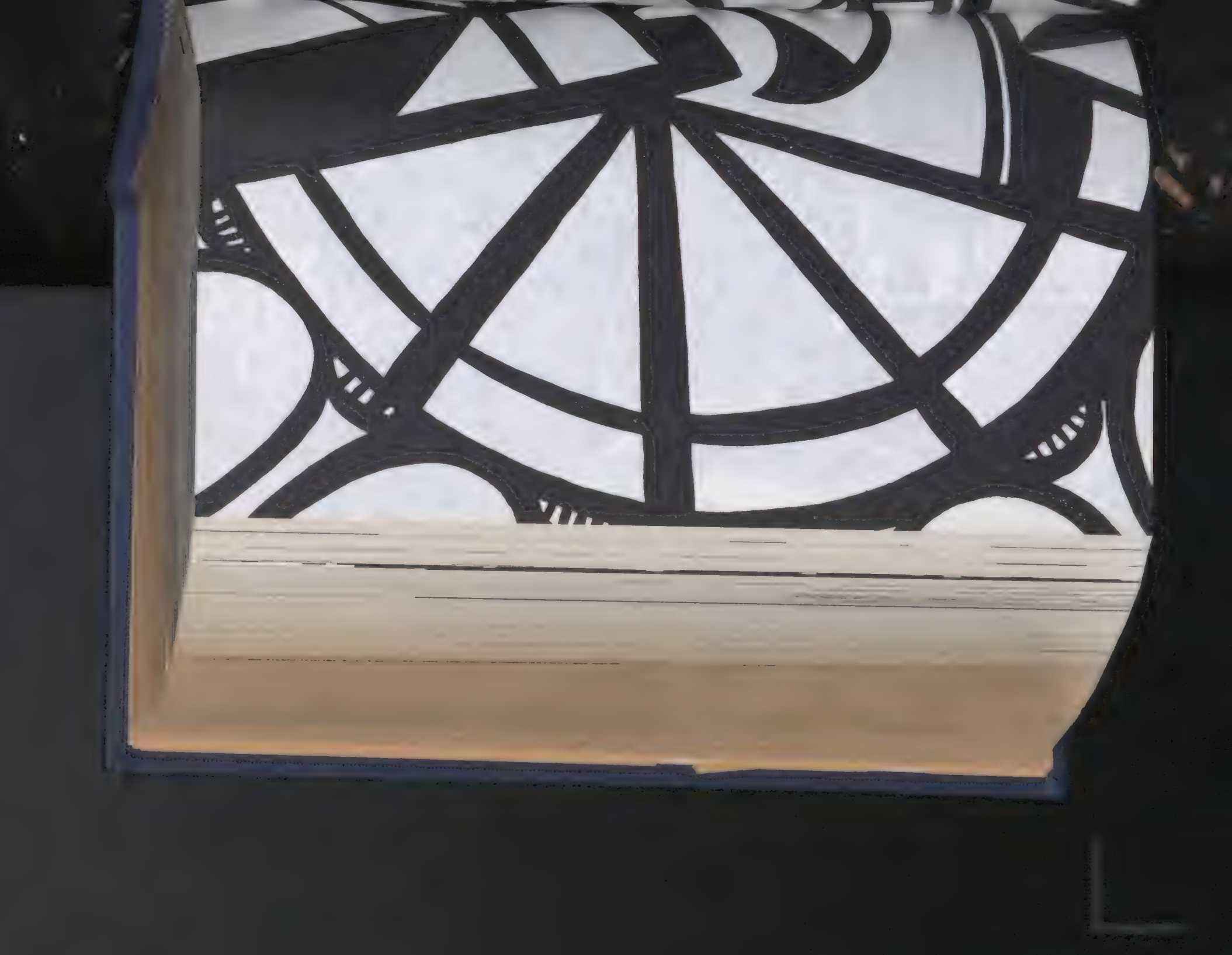
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

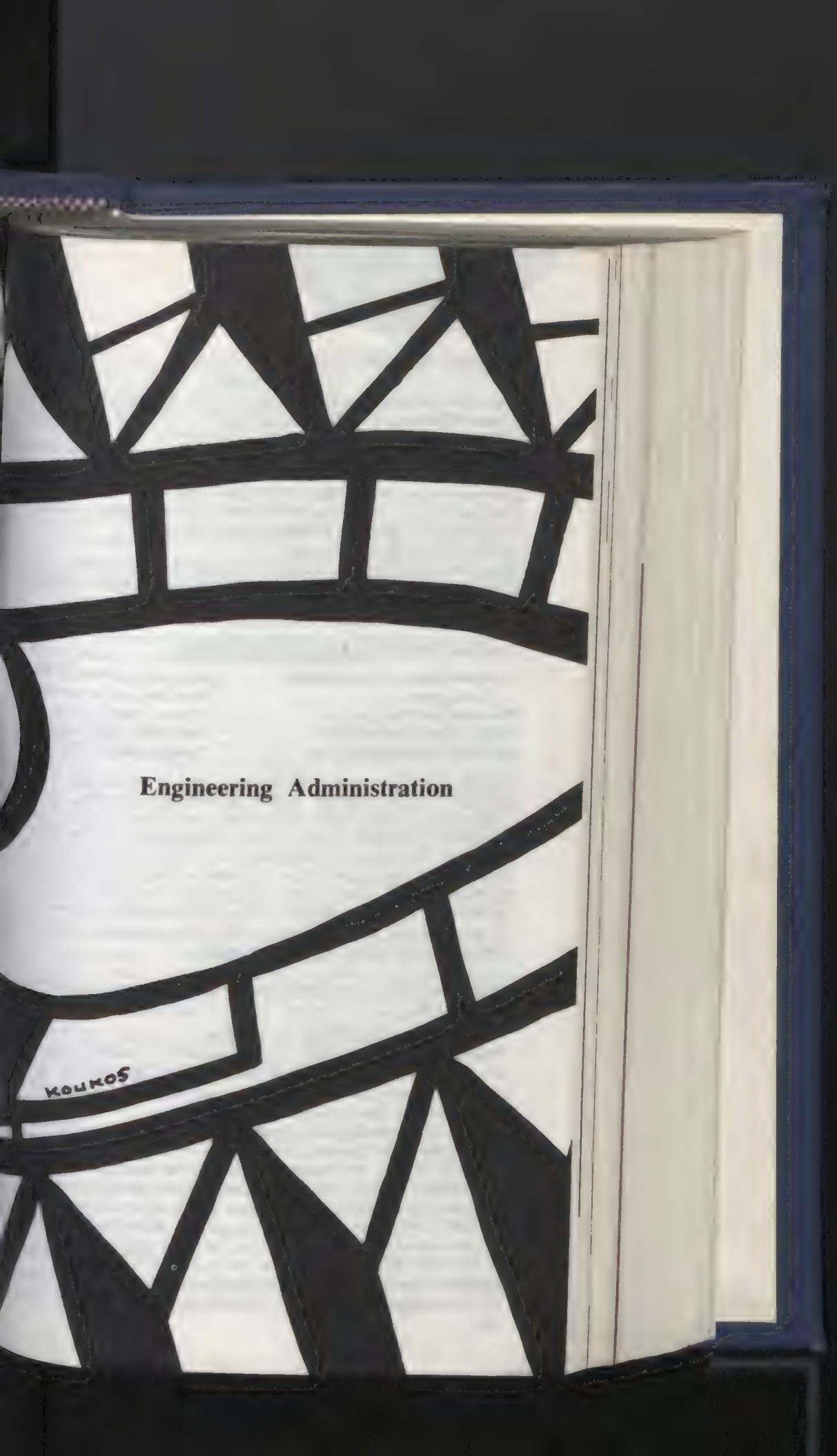
399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

* Offered at NASA-Langley Research Center; may be offered on campus when arranged


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Engineering Administration
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Engineering Administration

Professors P.A. Crafton, P.S. Shane, J. Kaye, M. Apstein *(Research)*, S. Ra
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(Research)
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Du Peza, C.W. Fotis, D.P. Hearth, G.T. Malley, J.A. Belding
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Associate Professorial Lecturers R.L. Paulin, D.R. Levin, A. Hoshovsky,
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Assistant Professor B. Silverman
Assistant Professorial Lecturers R.J. Lynch, Jr., P.G. O'Neill, K. Lamar,
Margulies, S. Ficarro, T.L. Griswold, M. Novinsky, T. Trybul, S.F.
R.E. Lohfeld, F.E. Field, H. Kwang-Wu Hung, W.A. Goetz

Graduate Fields and Areas of Concentration

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Information Systems Management
Marketing of Technology
Systems Analysis and Management
Technology and Public Affairs
Transportation Management

Programs in Engineering Administration lead to the degrees of Master of En
neering Administration and Doctor of Science and to the Professional degr
Programs in Administration of Research and Development, Construction M
agement, Environmental Management, Information Systems Management,
keting of Technology, Technology and Public Affairs, and Transportat
Management lead to the degree of Master of Engineering Administration. P
grams in Systems Analysis and Management lead to the degrees of Master
Science and Doctor of Science and to the Professional degrees. A student m
be accepted in a graduate program in order to receive credit for any gradu
courses taken to satisfy degree requirements.

THE MASTER OF ENGINEERING ADMINISTRATION DEGREE PROGRAM

The principal objective of the program leading to the degree of Master
Engineering Administration is to prepare students whose undergraduate edu
tion was in engineering, natural science, or mathematics for positions of
agerial responsibility in technological and scientific organizations in indu
government, or the armed services.

The program is designed to help the student achieve a broad understanding
the administrative process. Although years of experience are required to deve
the skills, insight, and mature judgment which distinguish an effective man
in technological and scientific organizations, a graduate professional man
ment curriculum can give the student an effective start as a manager. The
riculum provides an opportunity to gain an understanding and to develop
ful managerial skills in the functional areas of engineering administration.
of the major purposes is to assist the student in forming the habit of exa
problems from an overall administrative point of view. The individual's
particular experience, and the explicit process of relating this experience

te study, provide each student with a personal frame of reference to
et management in a rapidly changing world.
essful education for engineering administration implies an understand-
what it is that an engineering manager must do, an analysis of the
functions involved in management, and a detailing of modern methods
n making and executing decisions in the management of technological
entific organizations. It is the aim of the School, therefore, to keep alive
of general inquiry and a decision-making orientation.
management of technological organizations is one of the most difficult
ges of our times. The professional engineering manager today must un-
nd not only currently developing technologies but also the rapidly chang-
rketplace where these technologies are applied for society's benefit. The
ering administrator is the link between these dynamic technologies and the
of society in general.
ummary, the program of study has for its objective an educational ex-
e which will contribute to the development of managers possessing a
nation of technical know-how and administrative skill.

ion

ition to the requirements for admission to graduate study (see page
licants for programs leading to the degree of Master of Engineering Ad-
ation must meet the following requirements: (1) The applicant must
adequate knowledge of the principles of human relations, the fun-
ls of engineering economic analysis, and the fundamentals of quan-
methods. This requirement can be met by satisfactory completion of
owing undergraduate courses or approved equivalents: EAd 150, *Intro-
to Engineering Administration;* EAd 160, *Introduction to Engineering
c Analysis;* and EAd 170, *Basic Quantitative Methods for Engineer-
inistration.* (2) The applicant may be required to complete other un-
ate prerequisite courses prescribed as a condition of admission. (3)
t is required to earn the grade of *C* or better (unless the requirement
ted to be a grade of *B* or better upon admission) in each under-
prerequisite course. If this scholarship requirement is not met, the
barred from further enrollment. A student is not permitted to repeat
e undergraduate prerequisite courses. Credit for prerequisite courses
plicable toward the degree of Master of Engineering Administration,
s approved by the department chairman, all prerequisite courses must
eted prior to taking graduate courses in this degree program.

rses

ing courses are required for the Master of Engineering Administra-
e and must be taken prior to any other course in the program:
12 Engineering Administration (3–3)
Elements of Decision-making and Problem-solving (3)

rogram

NG ADMINISTRATION

ngineering administration provides the conceptual depth in manage-
ce and knowledge needed by technical and scientific personnel who

are confronted with increasing demands and complexities. Technical knowl
is complemented by an understanding of theory and practice in manage
action. Engineering management is a logical development of a techno
society. The program is designed to provide engineers with a knowledge
proficiency in the administration of engineering and science. It emphasizes
of deliberative, purposive study of general administrative problems and op
tunities, as well as the study and use of specific knowledge and methods nec
to solve administrative problems and to explore opportunities. A program
prescribed for each student in conference with the adviser.

Required Courses

EAd Core courses (9)

EAd 299–300 Thesis Research (6); or EAd 297 Problems in Engineering
ministration (3) (non-thesis)

Electives (18–21). Electives are chosen from the Department of Engineer
Administration and other departments of the University, but no more
two courses may be chosen from other departments.

Areas of Concentration

Students wishing to pursue a specific area of concentration, as opposed to
lowing the general program in EAd, may select one of the following prog

ADMINISTRATION OF RESEARCH AND DEVELOPMENT

The program is designed to prepare students for responsible managerial
tions in organizations conducting technological or scientific research and
velopment and in organizations planning and administering programs of
nological or scientific research and development. A program is prescribed
each student in conference with the adviser.

Required Courses

EAd Core courses (9)

EAd 207 The Personnel Function for Engineering Administration (3)

EAd 255 Administration of Research and Development (3)

EAd 299–300 Thesis Research (6); or EAd 297 Problems in Engineering
Administration (3) (non-thesis)

Electives (12–15)

CONSTRUCTION MANAGEMENT

Construction Management encompasses those managerial functions in an
ganization that plans and executes major construction work. This can
place in the field, in the project office, or in a main office. Due to the
complexity of present-day engineering, engineers need to know manage
as well as basic planning, design, and construction methods. They need to
construction developments, problems of contracts and specifications, re
of scheduling and control, estimating, labor relations, and industrial
agement psychology.

This program prepares the engineer for the task of marshalling men,
rials, machines, and money as functions of time, cost, weather, and

e to plan and build structures. A program is prescribed for each student nference with the adviser.

ired Courses

Core courses (9)
241 Construction Management I (3)
242 Construction Management II (3)
261 Economic Analysis in Engineering Planning (3)
299–300 Thesis Research (6); or EAd 297 Problems in Engineering ministration (3) (non-thesis)
ives (9–12)

ONMENTAL MANAGEMENT

program prepares students for responsible managerial positions in organi- conducting environmental control and in organizations planning and ineering programs in the prevention and control of environmental pollu- A program is prescribed for each student in conference with the adviser.

red Courses

Core courses (9)
221–22 Environmental Management (6)
261 Economic Analysis in Engineering Planning (3)
299–300 Thesis Research (6); or EAd 297 Problems in Engineering Ad- tration (3) (non-thesis)
s (9–12)

ATION SYSTEMS MANAGEMENT

ns of technological and scientific organizations encounter a variety of ment information systems required for day-to-day operations and long- cisions. This program helps to provide managers with the competence uch systems effectively. A program is prescribed for each student in ce with the adviser.

Courses

e courses (9)
Automatic Data Processing Systems (3)
Management of Computer Organizations (3)
Management of Technical Information (3)
Management Information Systems (3)
-300 Thesis Research (6); or EAd 297 Problems in Engineering tration (3) (non-thesis)
(6–9)

G OF TECHNOLOGY

erican economy matures and Americans survey the spectrum of op- able to them, it is apparent that scientific and engineering outputs

must be sold in world-wide competition both at home and abroad. The train
specialist is becoming more important than ever before in performing the s
ing function.

The objective of this program is to prepare students for responsible positio
in marketing technical products and services. A program is prescribed for ea
student in conference with the adviser.

Required Courses

EAd Core courses (9)
EAd 293 Technical Enterprises (3)
EAd 294 Marketing of Technology I (3)
EAd 311 Marketing of Technology II (3)
EAd 299–300 Thesis Research (6); or EAd 297 Problems in Engineering
Administration (3) (non-thesis)
Electives (9–12)

TECHNOLOGY AND PUBLIC AFFAIRS

This program prepares students for responsible positions requiring manage
decision-making on matters that involve the impact of technology on public
policy and that concern the general interrelationship between modern technology
and public affairs. A program is prescribed for each student in conference wi
the adviser.

Required Courses

EAd Core courses (9)
EAd 261 Economic Analysis in Engineering Planning (3)
EAd 386 Advanced Topics in Management (3)
EAd 299–300 Thesis Research (6); or EAd 297 Problems in Engineering
Administration (3) (non-thesis)
Electives (12–15)

TRANSPORTATION MANAGEMENT

The Transportation Management program prepares students for responsible
positions in the management of transportation systems or the formulation of
transportation policy. A program is prescribed for each student in conference
with the adviser.

Required Courses

EAd Core courses (9)
EAd 265 Transportation Management I (3)
EAd 266 Transportation Management II (3)
EAd 261 Economic Analysis in Engineering Planning (3)
EAd 299–300 Thesis Research (6); or EAd 297 Problems in Engineering
Administration (3) (non-thesis)
Electives (9–12)

THE MASTER OF SCIENCE DEGREE PROGRAM

s Analysis and Management

rogram leads to the degree of Master of Science and is administered by partment of Engineering Administration. Students are prepared for re- ble positions in the practice of systems analysis.

tudent should achieve a broad understanding of the administrative and n-making process and of the systems approach to managerial problem and be competent in applying mathematical and statistical techniques to ution of managerial problems.

graduate should be able to develop insight into the variety and nature of erial problems, their causes, and possible cures. In addition, the graduate understand the importance of the human factor in administration and to apply scientifically based analysis and quantitative methods in dealing anagerial problems. The systems viewpoint will help in learning to ar- and relate information about the organizational unit in which a problem Whether the student aspires to be a manager or to be a staff person deal- h managerial matters, the student should acquire concepts and experi- elpful in preparing for such a position.

ION

ion requirements for the Master of Science degree in Systems Analysis a bachelor's degree in engineering or natural sciences, or a major in atics from a recognized institution. Applicants to graduate study In addition, meet the following requirements: (1) the applicant must adequate knowledge of the principles of human relations, the fun- ls of engineering economic analysis, and the fundamentals of quantita- hods. This requirement can be met by satisfactory completion of the g undergraduate courses or approved equivalents: EAd 150, *Introduc- Engineering Administration;* EAd 160, *Introduction to Engineering Eco- Analysis;* and EAd 170, *Basic Quantitative Methods for Engineering ration.* (2) The applicant may be required to complete other under- e prerequisite courses prescribed as a condition of admission. (3) The is required to earn the grade of *C* or better (unless upon admission irement is stipulated to be a grade of *B* or better) in each undergraduate site course. If this scholarship requirement is not met, the student is from further enrollment. A student is not permitted to repeat any of ergraduate prerequisite courses. Credit for prerequisite courses is not e toward the degree of Master of Science in Systems Analysis, and, pproved by the Department Chairman, all prerequisite courses must be d prior to taking graduate courses in this degree program.

QUISITES (or equivalents)

0 Introduction to Engineering Administration (3)
0 Introduction to Engineering Economic Analysis (3)
0 Basic Quantitative Methods for Engineering Administration (3)
Applications of Computers (3)

may not receive graduate credit for these courses.

REQUIRED COURSES

EAd 211–212 Engineering Administration (3–3)
EAd 269 Elements of Decision-Making and Problem-Solving (3)
EAd 281–282 Systems Analysis and Management (3–3)
EAd 283 Systems Engineering
EAd 287 Systems Modeling and Simulation
EE 202 Linear System Theory I (3)

For Thesis Option
EAd 299–300 Thesis Research (3–3)

For Nonthesis Option (all students must take EAd 297 plus any two of the other four courses listed below)
OR 201 Survey of Operations Research Methods I (3)
OR 202 Survey of Operations Research Methods II (3)
OR 273 Digital Systems Simulation (3)
EE 203 Linear Systems Theory II (3)
EAd 297 Problems in Engineering Administration (3)

THE PROFESSIONAL DEGREE PROGRAM

The Department of Engineering Administration has established the Professional degree program for those students who are interested in pursuing course work beyond the Master's degree, with emphasis on applied subject material rather than research. The program leads to the degree of Applied Scientist or to the degree of Engineer and has been designed to meet the needs of industry and government for highly prepared personnel in engineering administration.

In the Professional degree program, emphasis is on increasing the student's knowledge, understanding, and skill by concentrating on principles and their application. This approach provides the individual with flexibility to adapt successfully to changing circumstances.

Each student's program is planned considering background and needs, subject to departmental requirements.

Professional Degree Study Programs

The Professional degree program provides post-Master's degree graduate study in areas in which the Department has adequate facilities and resources. Upon departmental approval, the student may select courses in other University departments to meet specific needs or objectives. Courses can, upon departmental approval, be chosen in the following areas:

Administration of Research and Development
Construction Management
Engineering Administration
Environmental Management
Information Systems Management
Marketing of Technology
Systems Analysis and Management
Technology and Public Affairs
Transportation Management

udent's program of study will provide concentration in a selected area, lude courses from other areas. A program consists of a minimum of 30 r credit hours of approved graduate courses beyond a Master's degree, which are devoted to a professional project. Students whose prior study ot include specified prerequisites may be required to take more than the m number of credit hours.

SION

ion to graduate study toward the Professional degree requires appro- achelor's and Master's degrees from recognized institutions, and evi- of capacity for productive study. To study toward the Professional de- Engineer (in Engineering Administration), an applicant must possess elor's degree in engineering; for the Professional degree of Applied t (in Engineering Administration), an applicant must possess a bache- gree in mathematics or a natural science. In both cases a Master's in engineering administration or a related field is required. Applicants equivalent backgrounds of study may be considered. At least a 3.00 in graduate study is required.

e applicants having Master's degrees in engineering, natural science, or atics may be required to meet the following prerequisites: at least the re courses (EAd 211–12, 269) with a grade of *B* or better.

e applicants wishing to pursue Systems Analysis must possess a Master's n systems analysis or a related field. Applicants having Master's degrees neering, natural science, or mathematics may be required to complete 1–12, 269, 281, and/or 282 with a grade of *B* or better.

ION TO CANDIDACY

licant is admitted to candidacy for the degree after satisfactorily meet- prerequisite requirements and conditions. No courses taken by the t to meet these prerequisite requirements and conditions can be applied the Professional degree. If course work beyond the prerequisites and ns is taken in the interval between admission to study and admission to andidacy, a maximum of only nine hours of this additional course work h the approval of the adviser, be applied toward meeting degree ents.

ER CREDIT

ix semester credit hours of satisfactory study (with grades of *A* or *B*) duate program beyond a Master's degree will be considered for transfer he Professional degree. They must have been earned within five years sion to candidacy for the Professional degree, and must be appropriate requirements for the Professional degree. The student must, with the of the adviser, petition the Department Chairman for such transfer.

OF STUDY

mission the student is assigned a faculty adviser. A program of study up considering any deficiencies at admission, preparation for the Com-

prehensive Examination, and Professional degree requirements. The progra
of study for each student must be approved by the student's adviser and th
Department Chairman. An area of concentration is selected to prepare the st
dent to undertake the professional project. Other courses are selected eith
to support work on the planned projects or to meet other needs. With pri
approval of the adviser, up to nine credit hours of study may be taken in oth
departments of instruction in the University if such work is pertinent to th
program. These nine hours include the six potential transfer credits.

PROFESSIONAL PROJECT

Each degree candidate must engage in a professional project on which the ca
didate will submit an acceptable report of an analysis and solution of a "re
world" problem in engineering administration. The student is to demonstra
ability to apply newly acquired knowledge to identify a problem, determine
significant problem, work toward a solution, and communicate the results i
writing.

When the course work is essentially completed, the candidate, with the advi
er's approval, will register for EAd 395-96 *Seminar: Professional Proje*
(3–3) to receive guidance in the professional project. Before registration f
candidate should have identified an area or project to study, and prepared a
study proposal, including consideration of the feasibility of the proposed e
fort. Shortly after registration for work on the project, the candidate mu
submit a detailed project proposal to the Department Chairman, with approv
of the project adviser. Six semester credit hours are assigned for work on th
project.

SCHOLARSHIP

No student studying for the Professional degree may receive more than tw
course grades below *B* or more than one *F*. If the student does receive mo
than two course grades below *B*, or more than one *F*, study is terminated
further enrollment is prohibited. A student must achieve a final quali
point average of at least 3.00 to receive the degree.

TIME TO COMPLETE PROFESSIONAL DEGREE REQUIREMENTS

A full-time student in the Professional degree program is allowed a maximu
of three calendar years to complete all degree requirements, from the date of
student's first registration as a graduate student in prerequisite or gradu
courses. A part-time student in this program is allowed a maximum of five
endar years. The time limit does not include any period of registration as an
classified student before admission to graduate status, nor does it encompass
specified period spent on approved leave of absence under the conditions
requirements then prevailing.

Students who do not complete degree requirements within the allowed ti
will have their graduate status terminated. They may be readmitted to gra
uate status under conditions specified by the Department Chairman.

ENCE AND CONTINUOUS STUDY

ork for the degree must be done in residence (on the campus) except special permission is granted by the Chairman of the Department. The t must maintain continuous registration in the School. Failure to do so the student's registration and necessitates application for readmission to ofessional degree program under whatever conditions and regulations ffect at that time.

DOCTORAL STUDY

ms in Engineering Administration and in Systems Analysis and Manage- ading to the degree of Doctor of Science provide advanced study and h to enable gifted students to extend their knowledge and to enhance reer opportunities in research or education.

ion to Doctoral Study

licants must meet the general requirements for admission to doctoral ated on page 30.

cants for doctoral study in Engineering Administration must have a degree, with a superior record of academic achievement in Engineer- inistration or a related field. Those applicants having Master's degrees eering, natural science, or mathematics may be required to meet the g prerequisites: at least the three core courses (EAd 211–12, 269) rade of *B* or better.

applicants wishing to pursue Systems Analysis and Management must a Master's degree in systems analysis or a related field. Applicants laster's degrees in engineering, natural science, or mathematics may be to complete EAd 211–12, 269, 281, and/or 282 with a grade of *B* .

plicant is admitted to candidacy for the degree after he has completed e and language requirements, and qualifying examinations.

to Candidacy

cant is admitted to candidacy for the degree after satisfactorily meet- prerequisite requirements and conditions and after completing *all* d language requirements, and qualifying examinations. (See p. 31.) es taken by the student to meet prerequisite requirements and condi- be applied toward the Doctoral degree. If course work beyond the tes and conditions is taken in the interval between admission to study sion to degree candidacy, a maximum of only nine hours of this course work can, with the approval of the adviser, be applied eeting degree requirements.

Credit

semester credit hours of satisfactory study (with grades of *A* or *B*) ate degree program beyond a Master's degree will be considered for ward the Doctoral degree. They must have been earned within the preceding admission for the Doctoral degree, and must be appro-

priate to satisfy requirements for the Doctoral degree. The student must, ... the approval of the adviser, petition the department chairman for such trans...

Programs of Study

Major fields leading to the degree of Doctor of Science are available in En... neering Administration and in Systems Analysis and Management. In addit... to the major field, one or two minor areas of concentration are normally r... quired, which may be chosen from the areas administered by this Departme... and/or from appropriate areas available in other departments of the Univ... sity. The general requirements for doctoral study are stated on pages 30–3...

Upon admission, the student is assigned a faculty adviser. A program ... study is drawn up considering any deficiencies at admission, preparation ... the Qualifying Examination, and Doctoral degree requirements. The progra... of study for each student must be approved by the student's adviser and ... Department Chairman. An area of study is selected to prepare the student ... undertake the dissertation research. Other courses are selected either to s... port work on the dissertation or to meet other needs.

Dissertation

Each degree candidate is required to prepare and submit a dissertation accep... ing to the requirements described on page 33. Once the Qualifying Exam... tions are satisfactorily completed, the candidate with the adviser's approval ... register for EAd 399, *Dissertation Research*. Before registration the candida... should have identified an area or project to study, and have prepared a re... search proposal, including consideration of the feasibility of the proposed ... effort. Shortly after registration for work on the research, the candidate must ... submit a detailed project proposal to the Department Chairman, with ap... proval of the Director of Research.

Scholarship

No student studying for the Doctoral degree may receive more than tw... course grades below *B* or more than one *F*. If the student does receive more ... than two course grades below *B* or more than one *F*, study is terminated and ... further enrollment is prohibited. A student must achieve a final quality-point ... average of at least 3.2 to receive the degree.

Time to Complete Doctoral Degree Requirements

A full-time student in the Doctoral degree program is allowed a maximum of ... five calendar years to complete all degree requirements, from the date of the ... student's first registration as a graduate student in prerequisite or graduate ... courses. A part-time student in this program is allowed a maximum of seven ... calendar years. The time limit does not include any period of registration as ... an unclassified student before admission to graduate status, nor does it en... compass any specified period spent on approved leave of absence under the ... conditions and requirements then prevailing. (See page 34.)

Students who do not complete degree requirements within the allowed time ... will have their graduate status terminated. They may be readmitted to graduate ... ate status under conditions specified by the Department Chairman.

ence and Continuous Study

ork for the degree must be done in residence (on the campus) except special permission is granted by the Chairman of the Department. The t must maintain continuous registration in the School. Failure to do so the student's registration and necessitates application for readmission Doctoral degree program under whatever conditions and regulations are at that time.

GINEERING ADMINISTRATION UNDERGRADUATE COURSES

50 Introduction to Engineering Administration (3)

The interrelationships of engineering, science, and management; conceptual foundations for interaction of human factors in individuals, groups, and the social environment of engineering activities. Familiarization with typical activities of engineering managers and with factors bearing on the motivation of engineers and on engineers as managers. Social and organizational factors relevant to the management of engineers. This course is preliminary to the complete management process studied in EAd 211–12. (Fall, spring, summer)

60 Introduction to Engineering Economic Analysis (3)

Economic decisions, equivalence, mathematics of finance, present worth, annual cost or profit, internal rate of return, benefit/cost ratio, incremental analysis, multiple alternatives, economic decisions under risk, inflation, depreciation methods, balance sheets, profit and loss statements, the accountant's view, and before- and after-tax analysis. (Fall, spring, summer)

70 Basic Quantitative Methods for Engineering Administration (3)

An introductory treatment of quantitative tools and techniques important in engineering administration. Concepts of probability statistics, and operations research. (Fall, spring, summer)

ENGINEERING ADMINISTRATION GRADUATE COURSES

4 Administration of Engineering Contracts (3)

Study of the total contracting process, including initial budget preparation and justification, actions leading to the execution of a contract, and administration of the contract to completion; considered from the viewpoints of the industrial and government buyer and the seller of technical materials and services. (Fall and spring)

The Personnel Function for Engineering Administrators (3)

Principles of managing human talent, the most vital resource in engineering or research; emphasis on principles, theory, and practical considerations of the personnel function for engineering managers, with practical applications in an engineering administration environment. (Fall and spring)

Engineering Law (3)

Legal principles and procedures of interest to engineers. The American legal system, contracts and specifications, liability of professional engi-

neers, product liability, agency relationships, patent and proprietary right
special problems in research and developmental contracts. (Fall a
spring)

211–12 Engineering Administration (3–3)

Comprehensive and systematic study of the administrative process; ind
trial, scientific, and engineering environments. Planning: objectives, po
diction, policies, and characteristics of plans. Organizing: theory of orga
ization, structure, authority, specialization, delegation, staff, and comm
tees. Directing: leadership, managing human and material resources
Controlling: setting standards, evaluating performance, using system feed
back data for correction and improvement. Prerequisite: EAd 150, an
160, or equivalent. (Fall, spring, summer)

221–22 Environmental Management (3–3)

The spectrum of technical, economic, political, administrative, and social
forces influencing the quality of our environment. Review of govern
mental and industrial programs to combat pollution of the air and wate
and to control pesticides, noise, and radiation. Historical development of
legislation dealing with environmental science and management. Review of
pending legislation involving environmental and energy matters; theoreti
cal aspects of specific management problems. (Academic year)

231 Program Management (3)

Programs and projects are widely used in industry and government to fa
cilitate the management of technical undertakings. Management science,
the systems approach, and traditional managerial concepts are applied to
a variety of typical cases. (Spring)

241 Construction Management I (3)

Contract negotiations; aspects of contracts and specifications important to
management. Construction estimating and cost allocation in heavy and
building construction; budgeting and accounting concepts. (Fall)

242 Construction Management II (3)

Construction administration: organization, construction planning, and
scheduling. Industrial relations and human factors in construction man
agement, work measurement, programming and progressing, project man
agement and control. (Spring)

243 Construction Management III (3)

Managerial problems associated with advanced methods of construction
and equipment; trend of mechanization; equipment policy and depreci
tion. (Fall)

251 Management of Computer Organizations (3)

Planning, organizing, and control of computer operations. Management of
a computer organization as an independent service bureau or as an integral
part of a larger organization. Supervision of professional and subprofes
sional computer personnel. Prerequisite: EAd 254. (Fall)

253 Production Management (3)

Planning, organizing, and control of production; forecasting techniques;
material management; methods of loading and scheduling production pro
esses; electronic methods in production control. Organization and admi

istration of the plant engineering function with emphasis on maintenance control programs. (Spring)

254 **Automatic Data Processing Systems** (3)

Logic of computers, hardware and software, systems analysis for data processing applications, systems design, systems economics. Impact on decision-making, business, and society. (Spring)

255 **Administration of Research and Development** (3)

The study of technological innovation as a vital part of the acquisition process; the role of the technical administrator in utilizing organization, plans, and control to accomplish research and development objectives. (Fall and spring)

261 **Economic Analysis in Engineering Planning** (3)

Case studies in engineering economic planning, advanced problems in engineering economy. Prerequisite: EAd 160 or an equivalent course in engineering economy, and permission of instructor. (Fall and Spring)

262 **Finance for Engineers** (3)

Exposition of the financial concepts encountered in engineering situations; financial statements, costing, inventories, profitability analysis, depreciation, credit, leasing, and capital formation. (Fall)

265 **Transportation Management I** (3)

Integration of social, technical, economic, and political considerations which shape transportation systems and their management. Course material focuses on industry and local, state, and federal government programs in transportation. A management study of a local, regional, or national system will be required. (Fall)

266 **Transportation Management II** (3)

Legal aspects of transportation systems and their management. (Spring)

269 **Elements of Decision-Making and Problem-Solving** (3)

Concepts and quantitative techniques of scientific method in solving administrative problems. Role of decision criteria and subjective factors. Managerial economics. Model building, testing, solving. Replacement under certainty or risk. Control-general, control charts, sampling inspection. Experimentation to differentiate variables, build models-canons of induction, statistical tests, analysis of variance, linear regression. Application to nonmathematical formulations. (Fall, spring, and summer)

281 **Systems Analysis and Management I** (3)

The systems or holistic approach as a methodology for making decisions and allocating resources. Analysis by means of objectives, alternatives, models, criteria, and feedback. (Fall)

282 **Systems Analysis and Management II** (3)

Extension and elaboration of systems analysis techniques, including their application to industry, input-output structures, human behavior in organizations, and military situations. Prerequisite: EAd 281. (Spring)

283 **Systems Engineering** (3)

Concept of system structure and organization. Linear and nonlinear sy
tems analysis; dynamics and stability of systems. Introduction to op
mization methods and systems simulation techniques. (Fall, odd years

285 **Seminar: Administrative Problems** (3)

Individual analysis of complex administrative problems, with group eval
ation and discussion. Prerequisite: 18 semester hours of graduate credit
(Fall and spring)

287 **Systems Modeling and Simulation** (3)

Introduction to systems modeling and simulation dealing primarily wit
industrial, organizational, and control models. Emphasis on analysis
the system performance and designing an improved system using analyti
cal or simulation techniques. Prerequisite: EAd 281, 283 or equivalent
and permission of instructor. (Fall, even years)

291 **Structural Analysis of Management Problems** (3)

Application of each phase of a structured problem-solving approach
small-scale management problems. Students will determine problem
symptoms; define problems; select a problem; determine constraints; d
solutions and alternative feasible solutions; develop the solutions, selec
one, test the solution, plan controls on it, and plan its implementation.
Prerequisite: EAd 269. (Spring, even years)

293 **Technical Enterprises** (3)

Essential features of technology-based companies from the entrepreneur
point of view. Team management of an enterprise in a computer-simu
lated environment. For those within technical firms and those within gov
ernment who depend on technical firms as suppliers. (Fall)

294 **Marketing of Technology I** (3)

Marketing industrial goods and high-technology projects; special attention
to the federal government as a market. Products, channels, pricing, pro
motion, and personal selling as elements of strategy. (Spring)

295 **Management of Technical Information** (3)

Needs and objectives of technical information systems, functions involved
in technical information, storage and retrieval, abstracting, computer
usage in technical information systems, system organization. Prerequisite:
EAd 251. (Spring)

297 **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply
various concepts and tools previously studied to the solution of a prob
lem in engineering administration. Students work individually or in small
groups, each on a problem proposed by the student and approved by the
instructor. Open to Master's degree students only. Departmental.
(Fall, spring, summer)

298 **Research** (arr.)

Basic or applied research in engineering administration or systems analy
sis. May be repeated for credit. Open to Master's degree students only.
Departmental. (Fall, spring, summer)

300 **Thesis Research** (3-3)
(Fall and spring)

311 **Marketing of Technology II** (3)
Continuation of EAd 294. Special attention to marketing research, negotiation, and internationai marketing. Required for Master's degree candidates in the Marketing of Technology program. Prerequisite: EAd 294. (Fall, even years)

321 **Management Information Systems** (3)
Study of the development and management of information systems used by middle and higher management of technological and scientific organizations, in the control of many facets of the organization at all managerial levels. Required for Master's degree candidates in the Information Systems Management program. Prerequisite: EAd 295. (Spring, even years)

Advanced Topics in Management (3)
Reading and discussion of classic and important recent literature concerning the philosophy and application of management principles. (Fall, odd years)

87 **Technological Forecasting** (3)
Concepts and methodology: normative and exploratory forecasting, resource allocation and forecasting, technology transfer, technological change and its effects on forecasting, technology assessment. (Spring, even years)

8 **Cost Effectiveness** (3)
Concepts of evaluation of engineered systems, current methods and trends in methodology, system resource requirements, probability and decision theory in cost effectiveness studies, systems approach to cost effectiveness studies. (Spring, odd years)

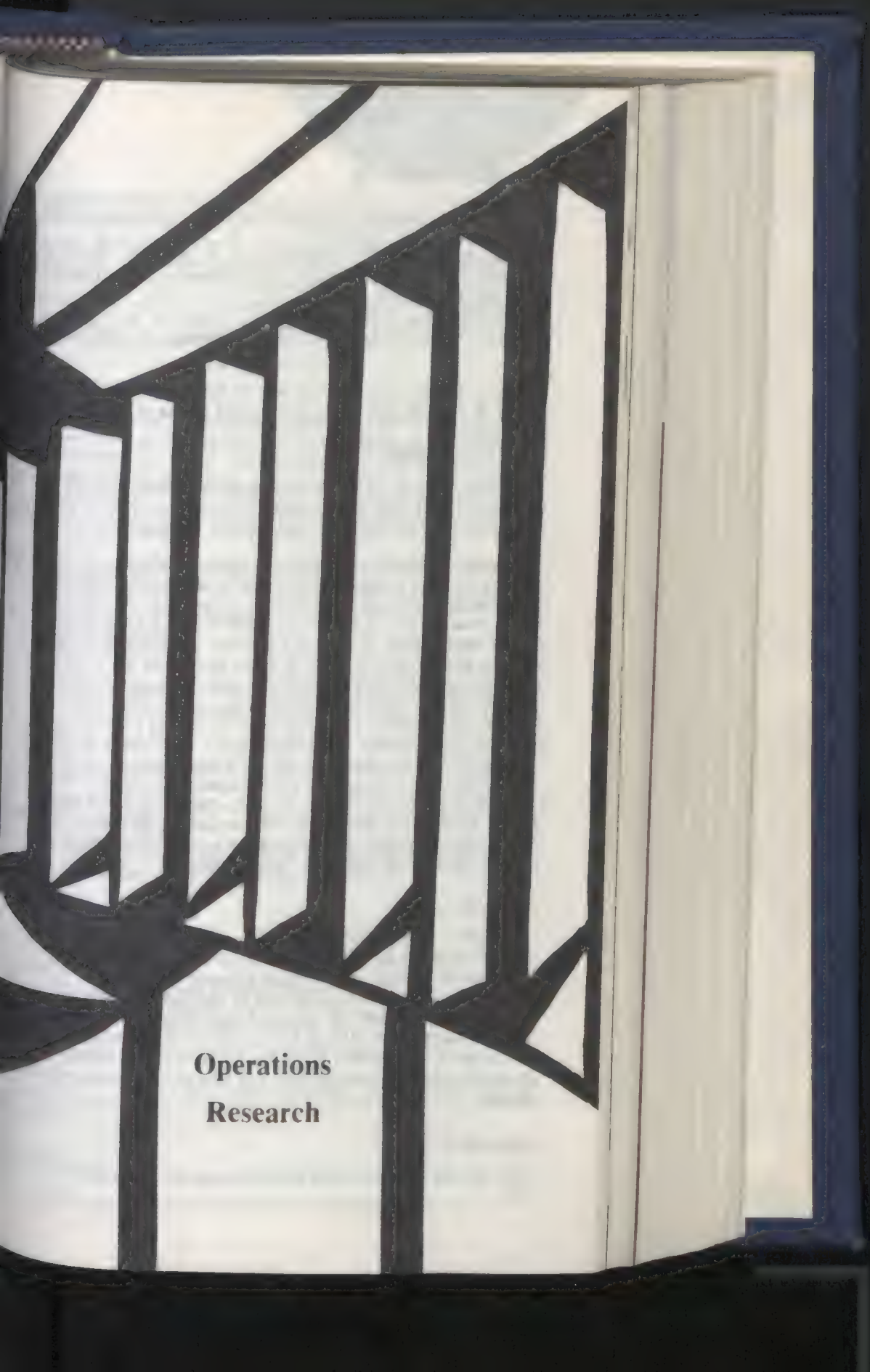
4 **Advanced Study** (arr.)
Limited to Departmental Professional degree students. May be repeated for credit. (As arranged)

6 **Seminar: Professional Project** (3–3)
Limited to Departmental Professional degree candidates. (As arranged)

8 **Advanced Reading and Research** (arr.)
Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

9 **Dissertation Research** (arr.)
Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)




Operations
Research

Operations Research

Professors W.H. Marlow, D. Gross *(Chairman)*, N.D. Singpurwalla, A.V. Fiacco, G.P. McCormick, J.E. Falk
Professorial Lecturers F. Frishman, J.D. Waller, I.N. Shimi, H. Weingartner
Associate Professorial Lecturers D.R. Edmonds, J.L. Horowitz, G.R. Mc Nichols, L.J. Riccio
Assistant Professor Z. Barzily
Assistant Professorial Lecturers J.W. Blankenship, K. Hoffman

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Programs in operations research lead to the degrees of Master of Science, Doctor of Science, and to the Professional degree of Applied Scientist.

MASTER'S STUDY

The objective of the Master's program in operations research is to prepare students with appropriate undergraduate backgrounds for in-depth study of analytically oriented techniques of management decision-making and their applications.

Expanded scientific, statistical, and mathematical knowledge, combined with growing needs in technological as well as social areas, have created increased demands for individuals trained in operations research. The discipline of operations research uses scientific principles supported by statistical and mathematical methodology to study the function and structure of complex industrial, military, and social systems in an effort to evaluate the probable effects of proposed courses of action, to establish criteria to judge the effectiveness of these courses, and to assist in the making of optimal decisions. The program in operations research provides a scientific basis for solving problems involving the interaction of many factors and organizational components in the interests of the whole system. This breadth of interest is an example of the "systems approach" in the sense that a system is an interconnected complex of functionally related components. Most operations research efforts begin with specific aspects of a general problem and proceed to consideration of the system as a whole. Just as the engineer may start with the study of subsystems or components of a general problem, so may the operations research analyst.

Admission

In addition to the requirements for admission to graduate study (see page 23), the applicant for the program in operations research leading to the degree of Master of Science must have an adequate knowledge of probability and statistics. This requirement can be met by satisfactory completion of the following undergraduate courses or approved equivalents: ApSc 115 and ApSc 116, *Engineering Analysis III and IV*. It is generally possible to take these courses concurrently with courses taken for graduate credit; however, in no case may these undergraduate courses fulfill any part of the requirements for the Master's degree.

Required Courses

Core courses required in the field of operations research are OR 201, 202, 2

nd 299–300 (for those electing a thesis) or 291 (for those not electing a . Students must complete OR 201, 202, 209, and 210 before attempting ther courses; however, in certain cases, permission may be granted for rrent registration. Students electing OR 291 normally complete this course last semester of the program. The remainder of the program is selected, he approval of the adviser, in an area of concentration from courses in the rtment of Operations Research. Appropriate courses from other depart- of the University may also be approved as electives.

f Concentration

al of the Department of Operations Research is to provide programs flex- ough to accommodate both those who are interested in applications and who are interested in theory. Specific areas of concentration and sug- departmental electives follow:

L OPERATIONS RESEARCH

R 251: Linear Programming
R 252: Nonlinear Programming I
R 261:
R 275: Theory of Games
R 277: Introduction to Scheduling
R 279: Queuing Theory
Inventory Control

approval of the adviser, other courses within the Department may be elected.

SYSTEMS

251: Linear Programming
252: Nonlinear Programming I
271: Forecasting Techniques
277: Queuing Theory
279: Inventory Control
approval of the adviser, courses may be elected from the Department of hanical, and Environmental Engineering.

S ENGINEERING

37: Logistics Planning
51: Linear Programming
53: Integer, Network, and Dynamic Programming
71: Forecasting Techniques
75: Introduction to Scheduling
79: Inventory Control
81: Reliability Theory I

pproval of the adviser, courses may be elected from the Departments of Business Administration, Management Science, and Electrical Engineering ter Science.

ENT SCIENCE

2: Applications of Linear and Nonlinear Optimization Theory

OR 237: Logistics Planning
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 279: Inventory Control

With the approval of the adviser, courses may be elected from the Department of Business Administration, Economics, Engineering Administration, and Management Science.

MATHEMATICAL MODELING IN INFORMATION SYSTEMS

OR 251: Linear Programming
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory

With the approval of the adviser, courses may be elected from the Department of Electrical Engineering and Computer Science, Engineering Administration, and Management Science.

MATHEMATICAL OPTIMIZATION

OR 251: Linear Programming
OR 252: Nonlinear Programming I
OR 253: Integer, Network, and Dynamic Programming
OR 261: Theory of Games
OR 275: Introduction to Scheduling

With the approval of the adviser, courses may be elected from Applied Science and the Department of Mathematics.

MODEL BUILDING FOR TRANSPORTATION FLOWS

OR 231: Theory of Traffic Flow
OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 251: Linear Programming
OR 252: Nonlinear Programming I
OR 273: Digital Systems Simulation
OR 277: Queuing Theory
OR 281: Reliability Theory I

With the approval of the adviser, courses may be elected from the Departments of Civil, Mechanical, and Environmental Engineering; Engineering Administration; Urban and Regional Planning; and from the National Law Center.

OPERATIONS RESEARCH IN INDUSTRIAL ENGINEERING SYSTEMS

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 237: Logistics Planning
OR 251: Linear Programming
OR 252: Nonlinear Programming I
OR 271: Forecasting Techniques

OR 273: Digital Systems Simulation
OR 275: Introduction to Scheduling
OR 277: Queuing Theory
OR 279: Inventory Control
OR 281: Reliability Theory I

TITATIVE DECISION-MAKING FOR PUBLIC POLICY

OR 232: Applications of Linear and Nonlinear Optimization Theory
OR 235: Operations Research in Public Policy
OR 236: Operations Research in Social Systems
OR 251: Linear Programming
OR 261: Theory of Games
OR 271: Forecasting Techniques
OR 273: Digital Systems Simulation

e approval of the adviser, courses may be elected from the Departments of echanical, and Environmental Engineering; Economics; Public Administra- d Urban and Regional Planning.

STIC MODELING

271: Forecasting Techniques
273: Digital Systems Simulation
277: Queuing Theory
279: Inventory Control
281: Reliability Theory I

approval of the adviser, courses may be elected from the Department of

PROFESSIONAL DEGREE PROGRAM

n of advanced study and research leads to the degree of Applied Scien- program is designed to provide an educational opportunity for students in pursuing post-Master's study with emphasis on applied subject her than on basic research.

n to the general requirements for admission to Professional degree pages 27–28), admission requires an appropriate Master's degree ognized institution and evidence of a capacity for productive work as by prior scholarship. The applicant must also possess a bachelor's either engineering, mathematics, or administration. In certain cases, having an equivalent quantitative background may be considered for by the Department.

Study and Requirements

m of study consists of an applied operations research major and an -of-department minor. A minimum of 30 semester hours is required Professional degree, including a minimum of 12 hours in operations at 201–202, and a three-hour Professional degree project. In addi-

tion, an applied nine-hour minor outside the department is required. Appropri
ate minor areas include economics; engineering administration; systems analy
sis, computer science; systems science, networks and controls; urban and re
gional planning; transportation systems; environmental engineering; and energ
systems.

DOCTORAL STUDY

Programs in operations research leading to the degree of Doctor of Scienc
provide advanced study and research to enable students to extend their fields o
knowledge and to enhance their career opportunities in research, analysis, man
agement, administration, or education.

Admission

In addition to the general requirements for admission to doctoral study (
page 30), the applicant for the doctoral program in operations resear
must have a Master's degree, with a superior record of academic achievemen
Outstanding professional performance is also considered in evaluating applicati

Programs of Study

Doctoral programs are planned so that the student may obtain adequate breadth
in operations research and sufficient depth in areas of specialization which will
enable the completion of a dissertation that will be a significant contribution to
the field. Possible areas of concentration include mathematical programming,
sequencing and scheduling, inventory, queuing, and reliability. In addition to
the major in operations research, two minor areas of concentration are normally
required. One minor generally is in applied science, mathematics, or statistics.
The second minor may be chosen from areas of concentration within the De
partment or from appropriate areas available in other departments of the Uni
versity, such as Business Administration; Civil, Mechanical, and Environmental
Engineering; Economics; Electrical Engineering and Computer Science; Engi
neering Administration; Health Care Administration; Management Science;
and Urban and Regional Planning. The general requirements for doctoral study
are stated on pages 30–34.

OPERATIONS RESEARCH GRADUATE COURSES

201 Survey of Operations Research Methods I (3)

Basic concepts and techniques of operations research as applied to prob
lems in industrial, governmental, and military decision making. Alloca
tion models; including the simplex procedure of linear programming;
transportation and assignment models; queuing theory; inventory theory;
game theory; and decision-making under uncertainty. Prerequisite: Apl
115 or equivalent. (Fall and spring)

202 Survey of Operations Research Methods II (3)

Simulation, Monte Carlo techniques; networks; integer programming;
troduction to nonlinear programming; dynamic programming; relia

and replacement. Prerequisite: OR 201 or permission of instructor. (Fall and spring)

209 **Mathematics in Operations Research I** (3)

Fundamental methods and practical procedures for deterministic decision models in operations research involving a number of variables. Applications of linear models for resource allocations. Applications to data representation and algorithmic procedures for linear and nonlinear optimization models. Applications of linear algebra and real multivariate analysis. (Fall)

210 **Mathematics in Operations Research II** (3)

Fundamental methods and practical procedures for stochastic decision models in operations research involving applications of complex variables. Applications of linear differential, difference, and differential-difference systems to various areas in operations research. Applications of modern numerical methods. (Spring)

231 **Theory of Traffic Flow** (3)

Definitions and measurement of traffic stream parameters; dynamic theories: follow-the-leader models of traffic flow; kinematic theories and fluid analogies; traffic cybernetics; statistical distributions and queuing theory; stochastic approaches to static delay problems; simulation of traffic problems. Prerequisite: ApSc 115 or equivalent. (Spring, odd years)

232 **Applications of Linear and Nonlinear Optimization Theory** (3)

Introduction to penalty-function methods for solving linear and nonlinear optimization problems through use of existing computer codes. Formulation of optimization models in application areas of structural design, nutrition, pollution control, resource allocation, biology, economics, psychology, statistics, and chemical processes. Admission by permission of instructor. (Fall)

235 **Operations Research in Public Policy** (3)

Quantitative methods in health, education, and welfare. Health planning models, hospital operations analysis, analysis of educational systems, and welfare planning. Case studies include medical manpower planning, hospital admissions systems, comprehensive health care planning models, assessment of effects of innovation in education, determination of welfare priorities, and resource allocation in welfare problems. Prerequisite: knowledge of calculus and fundamentals of probability and statistics. May be repeated for credit. Admission by permission of instructor. (Fall)

236 **Operations Research in Social Systems** (3)

Quantitative methods in urban development and the administration of justice. Studies of police operations; models for court management; analysis of correctional problems; location of public facilities; scheduling and routing problems; manpower usage; passenger, freight, and vehicular traffic problems; housing problems; models of emergency operations. Prerequisite: knowledge of calculus and fundamentals of probability and statistics. May be repeated for credit. Admission by permission of instructor. (Spring)

237 **Logistics Planning** (3)

Quantitative methods in model building for logistics systems including organization, procurement, transportation, inventory, maintenance, and their

interrelationships. Applications stressed. Prerequisite: ApSc 115 or equivalent. (Spring, even years)

251 Linear Programming (3)

Basic computational, theoretical, and applied areas with emphasis on the general linear programming problems; simplex procedures; duality problems; parametric linear programming and sensitivity analysis, transportation problems. Prerequisite: OR 201 or permission of instructor. (Fall and spring)

252 Nonlinear Programming I (3)

(Formerly Nonlinear Programming)

Basic topics in optimization theory, including first- and second-order optimality criteria, convexity, duality, and algorithms. Methods for solving unconstrained, linearly constrained, and nonlinearly constrained problems. Applications discussed where appropriate. Prerequisite: OR 202, permission of instructor. (Spring)

253 Integer, Network, and Dynamic Programming (3)

Methods and applications of optimization problems requiring integral solutions. Cutting plane methods, branch and bound methods, group theoretic methods. Dynamic programming. Network programming: shortest route problems, max flow problems. Prerequisite: OR 202, 251; or permission of instructor. (Fall, even years)

261 Theory of Games (3)

Study of mathematical models with applications to the relationships among independent competitive entities (persons or organizations in environments of competition, bargaining, bidding), selection of optimum strategies, minimax concept, connections with linear programming and decision functions, two-person and n-person zero and nonzero sum games. Prerequisite: OR 201 or permission of instructor. (Fall)

271 Forecasting Techniques (3)

Introduction to various techniques of forecasting available to an operations research analyst or engineer. Topics include the use of regression analysis in forecasting and other heuristic forecasting techniques. Emphasis on detailed development of the Box-Jenkins technique for time series analysis, including moving averages and exponential smoothing as special cases. Techniques covered will be applied to engineering, business, and economic situations, using special computer program packages. Prerequisite: ApSc 115, 116; or equivalent. (Spring, even years)

273 Digital Systems Simulation (3)

Monte Carlo techniques, random number and random deviate generation. Simulation languages. Operating considerations, including model validation, steady-state, and statistical analyses of simulation output. Applications in inventory, queuing, and production scheduling. Prerequisite: OR 201, 202, or permission of instructor; and knowledge of FORTRAN or BASIC. (Spring, odd years)

275 Introduction to Scheduling (3)

Theory of scheduling with emphasis on industrial applications; assembly line balancing; sequencing and scheduling of jobs in machine shops. Mathematical optimization, heuristic programming, and computer simulation approaches to these problems are examined. Prerequisite: OR 201 and 251; or permission of instructor. (Fall, odd years)

277 **Queuing Theory** (3)

Characterization of queuing systems. Single-channel exponential models. Additional Markovian single- and multiple-channel models, including birth-death processes, finite sources, bulk queues, Erlangian models, and series queues. Models with general arrival and/or service patterns. Model-building, basic solution techniques, and formal theoretical developments are stressed. Prerequisite: ApSc 116, OR 201; or permission of the instructor. (Spring)

279 **Inventory Control** (3)

Application of mathematical techniques to decisions regarding when and how much to produce or purchase. Various mathematical models of inventory systems with deterministic and stochastic demands, continuous and periodic review policies, multi-item models with constraints. Demand uncertainty and forecasting in inventory models. Prerequisite: OR 201 or permission of instructor. (Fall)

81 **Reliability Theory I** (3)

Topics introducing the mathematical and statistical theories of reliability. Mathematical theory includes the theory of coherent structures, association of random variables, stochastic characterization of wear, total positivity, preservation theorems, and bounds and inequalities. Statistical theory includes probabilistic derivation of failure models; testing goodness-of-fit; censored, truncated, and sequential life testing procedures using classical and Bayesian techniques; testing reliability hypotheses and their applications in the commonly used military standard plans. Prerequisite: ApSc 115, 116; or equivalent. (Fall)

91 **Problems in Operations Research** (3)

Field experience in operations research on a team basis. Each small group locates an actual problem and formulates a solution by operations research models. Class evaluation of progress. (Fall and spring)

97 **Special Topics in Operations Research** (3)

Selected topics in operations research, as arranged. Prerequisite: permission of instructor. May be repeated for credit. (Fall and spring)

98 **Research** (arr.)

Basic or applied research in operations research. May be repeated for credit. (Fall and spring)

00 **Thesis Research** (3–3)

(Fall and spring)

1 **Advanced Topics in Mathematical Programming** (3)

Special topics selected from fractional and geometric programming, branch-and-bound methods, max-min problems, pseudo-Boolean programming, calculus of variations, optimal control, penalty function methods, Lagrangian algorithms, fixed point procedures, sensitivity analysis, and large-scale programming. Prerequisite: OR 252 or permission of instructor. (Spring)

Nonlinear Programming II (3)

Convex analysis, algorithmic convergence, and rate of convergence. Proofs of optimality conditions. Factorable programming and other problems with special structures. Matrix methods, sensitivity analysis, and noncon-

vex optimization. Prerequisite: OR 252 or permission of instructor. (Fall)

361 Decisions and Value Theory (3)

Subjective probability and utility theory. Optimal nonsequential and sequential decision processes: Bayes risks and Bayes decisions, randomization and mixed decisions. Optimal stopping. Prerequisite: ApSc 116 and OR 261; or permission of instructor. (Spring, odd years)

371 Advanced Topics in Forecasting (3)

Continuation of OR 271 designed for those who wish to develop further capability in this area. Topics include a brief review of OR 271, estimation of parameters of Box-Jenkins models, transfer function models relating two or more time series, models for intervention analysis, models for feedforward and feedback control schemes. Also, other techniques and concepts useful in forecasting, such as spectral analysis of time series, including cross-spectral analysis and Fourier analysis. Review and discussion of current literature. Prerequisite: OR 271 or equivalent or permission of instructor. (Fall, even years)

377 Advanced Stochastic Models in Operations Research (3)

Selected applied probability models, including Brownian motion, renewal theory, denumerable Markov chains, semi-Markov processes, and Markov decision problems. Applications to topics in advanced queuing and inventory theories, including busy periods, waiting times, imbedded Markov chains, and GI/G/1 queues; and conditions for optimality of (s, S) policies, stochastic leadtime problems, state-dependent leadtimes, and multi-echelon problems. Prerequisite: OR 277, 279; or permission of instructor. (Fall, odd years)

381 Reliability Theory II (3)

Topics of current interest in the mathematical and statistical theories of reliability. Mathematical theory includes stochastic characterization of multivariate survival, shock models and wear processes, stochastic majorization and its applications, and reliability theory for multi-state components. Statistical theory includes total time on test processes and plots, goodness-of-fit tests using total time on test plots, estimation and forecasting failure rates, and comparison of stochastic processes. Prerequisite: OR 281. (Spring, even years)

391 Project for Professional Degree (3)

Limited to students in the Professional degree program. (Fall and spring)

397 Advanced Topics in Operations Research (3)

Advanced topics from the literature of operations research for analysis, presentation, and discussion. Reading assignments from the professional journals selected by the instructor and the student. May be repeated for credit. Admission by permission of instructor. (Fall and spring)

398 Advanced Reading and Research (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit. (Fall and spring)

399 Dissertation Research (arr.)

Limited to Doctor of Science candidates. May be repeated for credit. (Fall and spring)

quired Courses in Engineering Undergraduate Curricula ed by Columbian College of Arts and Sciences and by the Graduate School of Arts and Sciences

venience, descriptions of required courses in undergraduate curricula re offered by Columbian College of Arts and Sciences and the Graduate of Arts and Sciences are listed here. See the *Undergraduate and Grad-lletin* for elective courses in the humanities and social sciences.

BIOCHEMISTRY

2 General Biochemistry (3–4)

A comprehensive course in general biochemistry for graduate students in biomedical sciences and undergraduate students in biology and chemistry. Generally, graduate students *must* register concurrently for Bioc 223, and for Bioc 224. However, graduate students taking Bioc 225–26, ForS 281–82, Micr 241–42, or Phys 223–24 may register for Bioc 221–22 without the laboratory. With specific recommendations by the undergraduate adviser and the Department, undergraduate students may register for Bioc 221–22 without the laboratory. Prerequisite: Chem 152, 154. (Academic year)

BIOLOGICAL SCIENCES

Introductory Biology for Science Majors (4–4)

Lecture (3 hours), laboratory (3 hours). Biological principles and problems designed to furnish a base for advanced studies in biology and related sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $24 a semester. (Academic year)

Introduction to Vertebrate Embryology (4)

Lecture (2 hours), laboratory (4 hours). Origin and early development of the individual, formation of organ systems. Emphasis on frog, chick, and pig, with reference to human embryo. Material fee, $24. (Fall)

Histology (4)

Lecture (2 hours), laboratory (4 hours). Introduction to microscopical anatomy of normal tissues and organs with emphasis on the interrelationship of structure and function. Material fee, $24. (Fall and spring)

CHEMISTRY

General Chemistry (4)

For engineering and applied science students only. Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Atomic structure, chemical

bonding; chemical equations; acids and bases; chemical equilibrium; liqu and solid states; periodicity; electrochemistry; organic chemistry. Prereq site: Math 31, Phys 14 or 15. Laboratory fee, $28. (Fall)

22 Introductory Quantitative Analysis (4)

Lecture (2 hours), laboratory (6 hours). Theory and practice of qu tative analysis by classical methods; introduction to instrumental analy Prerequisite: Chem 12. Laboratory fee, $28. (Fall and spring)

151–52 Organic Chemistry (3–3)

Chemistry of the compounds of carbon. Prerequisite to Chem 151: C 12 or 16. Prerequisite to Chem 152: Chem 151. (Academic year)

153–54 Organic Chemistry Laboratory (1–1)

Laboratory complement of Chem 151–52. Prerequisite or concurrent istration: Chem 151–52. Prerequisite to Chem 154: Chem 153. Labo tory fee, $28 a semester. (Academic year)

ENGLISH

***9 English Composition: Language as Communication (3)**

Intensive grammar and composition course for students inadequately pre pared for Engl 10. Detailed instruction, drill, and exercises in basic struc ture in writing paragraphs; also includes content covered in Engl 10. In addition a noncredit reading course, given by the Reading Center, is re quired for students whose test scores show a reading deficiency. Engl 9 meets five hours per week and carries three semester hours of credit; the reading course meets an additional three hours a week for a maximum of 10 weeks. Special fee, $25. (Fall and spring)

***10 English Composition: Language as Communication (3)**

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence. Fre analysis of selected current prose; library research procedure. (Fall and spring)

GEOLOGY

136 Engineering Geology (3)

For students in the School of Engineering and Applied Science. Geolo cal principles and processes and their application to civil and mechanic engineering. Prerequisite: Math 31, Phys 2 or 4; or permission of in structor. (Spring)

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* Students whose College Board English Composition Achievement Test scores suggest inadequ preparation may be assigned to Engl 9 or may be tested in vocabulary, spelling, grammar, sta ard usage, and writing skill, before placement in either Engl 9 or 10. Students whose scores or writing skill indicate superior competence will be allowed to waive the Engl 10 requirement

MATHEMATICS

31 Precalculus and Calculus of One Variable (3)

A one-semester combination of Math 30 *Precalculus* and Math 31 *Calculus of One Variable*. The course meets five hours per week and carries three semester hours of credit. After completing the first half of the course (Precalculus), students are examined in precalculus. Students who pass the test continue in Math 30–31. Students who fail the test transfer to a regular Math 30 course for the remainder of the semester.

30 Precalculus (0)

Set theory, inequalities, basic analytic geometry, functions and relations. Polynomial, trigonometric, logarithmic, and exponential functions. Prerequisite: Math 3 and 6; or one and one-half years of high school algebra, one year of high school geometry, and one-half year of high school trigonometry; or equivalent. (Fall and spring)

1 Calculus of One Variable (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30* or equivalent. (Fall and spring)

3 Calculus of Several Variables and Calculus of Vector Functions (6)

A one-semester combination of Math 32 and Math 33, meeting five hours per week.

2 Calculus of Several Variables (3)

Techniques of integration. Partial derivatives, multiple integrals. Prerequisite: Math 31. (Fall and spring)

Calculus of Vector Functions (3)

Infinite series. Taylor series. Algebra and calculus of vectors. Vector fields. Line integrals. Green's and Stokes' theorems. Prerequisite: Math 32. (Fall and spring)

PHYSICS

Foundations of Physics (3)

Lecture (2 hours), recitation (1 hour). Development of conceptual principles underlying modern physical knowledge; basics of mechanics, heat and electromagnetism, including the classical concepts of energy, momentum, heat, temperature, entropy, electric and magnetic fields, optics. Prerequisite: two years of college preparatory mathematics or concurrent registration in Math 6.

Introductory Mechanics and Thermal Physics (3)

Lecture (2 hours), recitation and laboratory (2 hours). Physical principles of mechanics and thermal physics utilizing tools of calculus. Topics em-

*dents who have not successfully completed a college-level calculus course with a grade from an accredited institution, or high school students who did not take an advanced calculus course and receive a score of 4 or 5 on the AP test, will be required to er locally administered math placement test at registration. This test covers algebra, and graphs. Students who do not place directly into Math 31 (Calculus) as a result of be required to undertake a combined pre-calculus and calculus course (Math 30–31) rst semester; this combined course meets five hours per week and carries three semester if the student completes the second half.

phasized are vector calculus, equilibrium phenomena, kinematics, Ne
ton's Laws, conservation of mass, momentum and energy, rotatio
motion, small vibrations, thermometry, macroscopic and microsco
properties of ideal gases, the laws of thermodynamics, thermal proper
of solids and liquids. Prerequisite: Phys 3 or equivalent, Math 31. Labo
tory fee, $18.

15 **Elements of Electricity and Magnetism** (3)

Lecture (2 hours), recitation and laboratory (2 hours). Introductory
pects of electromagnetic theory. Topics include static electric fields, C
lomb's law, Gauss' Law, electric potential, capacitance and dielectri
electric current and resistance. Ampere's Law, Faraday's Law, Maxwe
equations in integral form, electromagnetic waves. Prerequisite: Phys 3
equivalent, Math 31. Laboratory fee, $18.

16 **Introduction to Modern Physics** (3)

Lecture (2 hours), recitation and laboratory (2 hours). Elementary
proach to basic principles of quantum theory. Topics include wave-pa
ticle duality, the hydrogen atom, Pauli's exclusion principle, X-ray spectra
the atomic nucleus, radioactivity, nuclear reactions, statistical distribution
laws, applications to molecular and solid state physics. Prerequisite
Phys 14, 15, Math 32. Laboratory fee, $18.



GENERAL INFORMATION

Registration

ATES, HOURS, AND PLACE OF REGISTRATION will be stated in the *Schedule* ses, which is available well in advance of each semester.
dents cannot register for classes without having received a letter of admis- the University issued by the appropriate admitting office.
egistration is accepted for less than a semester or less than one summer

ents may not register concurrently in this University and another insti- without the prior permission of the dean of the college, school, or divi- which the student is registered in this University. Registration in more e college, school, or division of the University requires the written per- of the deans concerned, *prior to registration*. Allowance of credit for one concurrently at another institution is at the discretion of the appro- ommittee.

ELIGIBILITY FOR REGISTRATION

ion for the following categories of campus students is held on the days ration stated in the University Calendar. A student who is suspended record is not clear for any reason is not eligible to register.
Student.—Upon receipt of a letter of admission, the new student is r registration on the stated days of registration.
ited Student.—A student previously registered in the University who egistered for campus courses during the preceding semester or sum- on must apply for and receive a letter of readmission from the appro- mitting office before the student is eligible for registration.
uing Student.—The student registered for campus courses in the im- preceding semester or the Summer Session preceding the fall semes- ible to register, assuming good standing and enrollment in a continu- on.

TION CHANGES AND WITHDRAWALS (see pages 188–189, 194–195)

on for Consortium Courses

udents interested in taking courses at any of the other institutions in rtium of Universities of the Washington Metropolitan Area, Inc. (see should consult the program announcements of the other institu-

tions. Consortium application forms and instructions may be picked up in Office of the Registrar after obtaining registration materials. In other to pa pate in the Consortium program, students must obtain the approval of an viser and should ascertain from the department of the institution where course is taught whether they are eligible for the course and whether the space in the class. Specific inquiries should be addressed to the Registrar

Fees and Financial Regulations

FEES PAID BY STUDENTS cover only a portion of the cost of the operation of University. Income from endowment funds, grants, and gifts from alumni friends of the institution makes up the difference.

The following fees and financial regulations were adopted for the 19 summer sessions and the 1978–79 academic year. (See page 186 for projec tuition and fee increases for 1979–82.)

Tuition Fees

For undergraduate study:

Full-time program (12 or more hours a semester)..... $1,5
Part-time program, for each semester hour.....
Summer Sessions, for each semester hour.....

For graduate study*

For each semester hour for which the student registers.....
Doctoral students are required to register for minimum hour-loads,† as follows:

1. Full-time doctoral students must register for a minimum of 12 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.
2. Part-time doctoral students must register for a minimum of 6 semester hours a semester until 24 hours of work have been completed beyond the qualifying examination; and for a minimum of 4 semester hours a semester thereafter until the satisfactory completion of the final examination.

University Center Fee

(Charged all students registered on campus‡)
For students registered for 11 or more semester hours on campus:
Each semester .....

* Registration in thesis courses (299-300) entitles the student, during the period of registra the advice of the member of the faculty under whom the thesis is to be written. In case a p unfinished an additional semester will be granted, requiring payment of a "continuous regist fee (see page 185). If the preparation of the thesis extends beyond the three-semester perio proval for this extension will be required, and the student must repeat the thesis course 300 wi tuition as for a repeated course, provided the overall time limit for earning the degree is ceeded.

† No minimum hour-load is required during the summer sessions.

‡ Students in off-campus programs are charged the University Center Fee only when registered courses on campus.

dents registered for less than 11 semester hours in a semester on

each semester hour for which the student registers $4.75
dents maintaining "continuous registration" status:
semester 4.75

nal Course Fees

ain courses additional fees, such as laboratory and material fees, are charged ted in the course description. These fees are charged by the semester and, otherwise indicated, may be defrayed in two payments when the tuition is paid manner. Breakage of apparatus is charged against the individual student. When e is in excess of the normal amount provided for in the laboratory fee, the in- student will be required to pay such additional charges as are determined by rtment concerned.

ion Fees

's, Master's, Doctor's degrees $25.00
binding Master's thesis 15.00
microfilm service and printing announcement of final examina-
r Doctoral degree 65.00

e Hall Fees (see pages 203–204).

ees and Deposits

on fee† (undergraduate degree candidates) nonrefundable $10.00
n fee (graduate degree candidates), nonrefundable..... 25.00
tuition deposit, nonrefundable, charged each entering or read-
full-time undergraduate student 100.00
eposit, nonrefundable, charged each applicant for residence hall
..... 100.00
tests (when required) 6.00–12.00
ration fee, for failure to register within the designated period.... 15.00
ent fee, for failure to make payments when due (see "Payment
" page 187) 15.00
einstatement fee, for reinstatement after financial encumbrance
ayment of fees (see "Payment of Fees," page 187) 35.00
heck fee, charged a student whose check is improperly drafted,
e, returned by the bank for insufficient funds, or returned for
r reason 15.00
registration fee, to maintain "continuous registration" status
y semester of absence from the University or after completion
requirements*—due and payable on the official days of reg-
nonrefundable 110.00
Council fee, charged each student in the School of Engineering
ed Science for each semester or any part thereof except the
erm 5.00

he continuous registration fee entitles the student who is granted leave of absence ontinue work toward a degree under the academic requirements which were in force irst registration. The continuous registration fee does not apply toward residence re- for degree. (See footnotes on page 184). Should a student add a course after paying gistration fee for the term, the fee will be applied toward tuition charges. See page ons governing Military Leave.

ee increased to $15 beginning with applications for admissions to the Summer Sessions

Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both .....
For each waiver examination to qualify for advanced placement .....
English test for international students (when required) .....
Laboratory checkout fee, for failure to check out of chemistry laboratory by the date deadline set by the instructor* .....
Transcript fee, for each transcript of record.....
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2 each; fee for additional copy.....
Replacement of lost or stolen picture identification card.....

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet*, the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES FOR 1979–82

In order that students and their parents may plan more realistically for a four-year period, tuition increases for the academic years 1979–80, 1980–81 and 1981–82 have been estimated as follows:

Increase by year (full-time undergraduate students):
1979–80 .....
1980–81 .....
1981–82 .....

Increase by semester hour (graduate and part-time undergraduate students):
1979–80 .....
1980–81 .....
1981–82 .....

The University Center fee will be increased for the 1979 summer session and the academic year 1979–80. For students taking 11 or more semester hours, the fee will be $55.50 per semester. Students taking fewer than 11 semester hours will pay $5.25 per semester hour.

It is not possible to project future economic data with certainty. The increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obliged to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable, and significant increases in tuition in excess of the above limits may be required.

* A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next regular laboratory period.

PAYMENT OF FEES

dent is permitted to complete registration or attend classes until all are paid. Tuition and fees for each semester are due and payable in he Office of the Cashier at the time of each registration. Checks and money orders should be made out to George Washington University, student identification number in the upper left-hand corner.

tudent Accounts Office has responsibility for billing and maintaining ccounts for tuition, various fees, and room and board charges. A stu- stered for six semester hours or more may sign a deferred payment with the Student Accounts Office at the time of each registration per- ayment of one-half of the total tuition and fees (except for fees pay- dvance) at the time of registration and the remaining half on or be- ber 25, 1978 (for the fall semester), and March 7, 1979 (for the nester). Interest at the rate of eight per cent per annum on the un- ce will be charged from the date of registration to the date payment

receiving tuition assistance in the form of scholarships, government tracts, or other forms of tuition awards are not permitted to sign ayment contracts unless the total tuition and fee charges exceed the e tuition awards by $750 or more. Under such circumstances the y be permitted to pay one-half of the amount due from the student of registration and to defer the balance by signing a deferred pay- ct.

who fail to make any payment when due will be automatically $15 late-payment fee and will be subject to the interest charge of nt per annum. Accounts which become 30 days past due will be ncumbered. In the event a student's account is financially encum- tudent forfeits his right to the use of deferred payment contracts in sters, and the Student Accounts Office will notify the Registrar to ades, future registration privileges, transcripts, diplomas, and other formation until the account is settled financially. Financial settle- quire payment in full of all amounts due the University in addi- ancial reinstatement fee of $35.

uditing courses are subject to all fees charged to students regis- lit.

AID AND DEFERRED PAYMENT PLANS FOR PARENTS

nercial programs for parents who wish to pay for college on a are available. Terms and conditions vary, but most provide a life cy in the contract. For specific details and applications, address e following:

du-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
C Knight Insured Tuition Payment Plan, 6 St. James Avenue, Mass. 02100
in Plan, Inc., Concord, N.H. 03301

ity's Office of Student Financial Aid does not maintain a supply for these various programs, but will be happy to provide guid- s and parents.

Special Columbian College of Arts and Sciences departmental examination for each course to qualify for receiving credit (advanced standing), waiver of requirement, or both 25
For each waiver examination to qualify for advanced placement 5
English test for international students (when required) 10
Laboratory checkout fee, for failure to check out of chemistry laboratory by the date deadline set by the instructor* 10
Transcript fee, for each transcript of record 2
If two or more transcripts are requested at the same time, fee for each of the first two copies is $2 each; fee for additional copy 1
Replacement of lost or stolen picture identification card 2

Registration for on-campus courses in the University entitles each student to the following University privileges: (1) the services of the Student and Alumni Career Services Office; (2) the use of the University Library; (3) gymnasium privileges; (4) admission to all athletic contests, unless otherwise specified; (5) subscription to the *University Hatchet,* the student newspaper; (6) admission to University debates; (7) medical attention as described under Student Health Service. These privileges terminate when the student withdraws or is dismissed from the University.

PROJECTED TUITION AND FEE INCREASES FOR 1979–82

In order that students and their parents may plan more realistically for a four-year period, tuition increases for the academic years 1979–80, 1980–81, and 1981–82 have been estimated as follows:

Increase by year (full-time undergraduate students):
1979–80 ..... $300
1980–81 200
1981–82 200

Increase by semester hour (graduate and part-time undergraduate students):
1979–80 ..... $12
1980–81 8
1981–82 8

The University Center fee will be increased for the 1979 summer session and the academic year 1979–80. For students taking 11 or more semester hours, the fee will be $55.50 per semester. Students taking fewer than 11 semester hours will pay $5.25 per semester hour.

It is not possible to project future economic data with certainty. The increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obliged to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable, and significant increases in tuition in excess of the above limits may be required.

* A student who drops a chemistry course before the end of the semester must check out of the laboratory at the next regular laboratory period.

PAYMENT OF FEES

tudent is permitted to complete registration or attend classes until all es are paid. Tuition and fees for each semester are due and payable in the Office of the Cashier at the time of each registration. Checks and money orders should be made out to George Washington University, ne student identification number in the upper left-hand corner.

e Student Accounts Office has responsibility for billing and maintaining t accounts for tuition, various fees, and room and board charges. A stu- egistered for six semester hours or more may sign a deferred payment et with the Student Accounts Office at the time of each registration per- g payment of one-half of the total tuition and fees (except for fees pay- advance) at the time of registration and the remaining half on or be- October 25, 1978 (for the fall semester), and March 7, 1979 (for the semester). Interest at the rate of eight per cent per annum on the un- alance will be charged from the date of registration to the date payment de.

dents receiving tuition assistance in the form of scholarships, government contracts, or other forms of tuition awards are not permitted to sign d payment contracts unless the total tuition and fee charges exceed the of the tuition awards by $750 or more. Under such circumstances the may be permitted to pay one-half of the amount due from the student time of registration and to defer the balance by signing a deferred pay- contract.

dents who fail to make any payment when due will be automatically d a $15 late-payment fee and will be subject to the interest charge of per cent per annum. Accounts which become 30 days past due will be ially encumbered. In the event a student's account is financially encum- the student forfeits his right to the use of deferred payment contracts in semesters, and the Student Accounts Office will notify the Registrar to old grades, future registration privileges, transcripts, diplomas, and other ific information until the account is settled financially. Financial settle- will require payment in full of all amounts due the University in addi- to a financial reinstatement fee of $35.

dents auditing courses are subject to all fees charged to students regis- for credit.

PREPAID AND DEFERRED PAYMENT PLANS FOR PARENTS

l commercial programs for parents who wish to pay for college on a y basis are available. Terms and conditions vary, but most provide a life ce policy in the contract. For specific details and applications, address n to the following:

Girard Edu-Check Plan, 2nd and Chestnut Streets, Philadelphia, Pa. 19106
Richard C. Knight Insured Tuition Payment Plan, 6 St. James Avenue, n, Mass. 02100
The Tuition Plan, Inc., Concord, N.H. 03301

University's Office of Student Financial Aid does not maintain a supply cations for these various programs, but will be happy to provide guid- students and parents.

WITHDRAWALS AND REFUNDS*

Applications for withdrawal from the University or for change in class schedu
are made by completing the George Washington University Change Slip (o
tainable in Room 103, Tompkins Hall), securing the approval of the approp
ate faculty, and submitting the form to Room 103 for the dean's signatur
Notification to an instructor is not an acceptable notice (see "Withdrawal
pages 194–95.)

Withdrawal and Change in Course Status

Courses may be dropped by undergraduate and graduate students witho
academic penalty only during the 28 days following the first day of classe
with the approval of the instructor, the student's adviser, and the Associat
Dean.

The status of a course may not be changed from credit to audit or vice-ver
after the 28th day after classes have started for the semester.

For other regulations governing withdrawal and changes in program,
pages 194–95.

In authorized withdrawals and changes in schedule, cancellations of semest
tuition charges and fees will be made in accordance with the followi
schedule for the fall and spring semesters:

1. *Complete withdrawal* from the University:

   Fall Semester

Withdrawal dated on or before September 8, 1978	90 per ce
Withdrawal dated September 11 to September 22, 1978	75 per ce
Withdrawal dated September 25, to October 6, 1978	50 per ce
Withdrawal dated after October 6, 1978	none

   Spring Semester

Withdrawal dated on or before January 19, 1979	90 per ce
Withdrawal dated January 22 to February 2, 1979	75 per ce
Withdrawal dated February 5 to February 16, 1979	50 per ce
Withdrawal dated after February 16, 1979	none

2. For a *change in status from full-time to part-time student* or for *partial wi*
   drawal by a part-time student, the above schedule applies to the differen
   in charges between the original program and the adjusted program contin
   ing in effect.
3. A student enrolled in an undergraduate full-time program who drops or ad
   a course and continues to be in a full-time program will have no financ
   adjustments of tuition made other than those involving course fees.
4. A student who is granted military leave before completing the semester w
   receive credits for current charges in accordance with the schedule
   complete withdrawal from the University (see No. 1, above). Payme
   made in excess of the nonrefundable balance will be refunded to the s
   dent. The nonrefundable balance will be maintained as a deferred cre
   for use by the student upon return to the University (see "Military Leav
   page 197).
5. Regulations governing student withdrawals as they relate to residence h
   and food service charges are contained in the specific lease arrangemen

* Regulations concerning withdrawals and refunds for the Summer Sessions are stated in the *Summ*
Sessions Schedule of Classes.

case will tuition be refunded or reduced because of absence from

ment applies only to the semester for which a registration charge is in- and will not be credited to another semester (exception: students grant- itary leave, see page 197).

orization to withdraw and certification for work done will not be given ent who does not have a clear financial record.

dents are encouraged to provide their own cash funds until they can make g arrangements in the community.

Financial Aid*

FOR UNDERGRADUATE STUDENTS

E WASHINGTON UNIVERSITY offers a program of financial assistance of sic types: awards for academic achievement without reference to finan- circumstances—honor scholarships; and scholarships, grants, loans, and yment based upon demonstrated financial need.

or Scholarships.—George Washington University honor scholarships of $1,000 for the academic year based entirely upon academic achievement ential without regard to financial need are restricted to incoming fresh- and are extremely limited in number.

d-based Aid.—The University offers extensive programs of scholarships, loans, and employment based upon demonstrated need. The University ates in the National Direct Student Loan, Basic Educational Oppor- Grant, Supplemental Educational Opportunity Grant, and the College Study programs.

plications and supporting credentials for financial aid must be filed by Feb- 1 (entering freshmen) or March 1 (enrolled undergraduate or entering r students) preceding the academic year of the award for the fall semes- November 1 for the spring semester; and by April 1 for the summer m.† A student must reapply for financial aid each year.

plete information concerning financial assistance is contained in the let, "Student Financial Aid," which is available at the Office of Student ncial Aid, George Washington University, Washington, D.C. 20052.

rships and Grants

rships are awarded for the academic year unless otherwise specified and dited in equal parts for each semester. Each holder must carry a full e of academic work during the period for which the scholarship is ven.

following scholarships are limited to students in the School of Engineer- Applied Science. The University offers many others which are open to ering students.

erick Albert and Alma Hand Britten Scholarships (1959).—Bequest of land Britten for scholarship assistance to students entering the School of

ation concerning financial aid for students from foreign countries, see pages 192–193.

mmons students are eligible for consideration only if they were enrolled in this University e 8 semester hours in the immediately preceding spring semester or have applied for finan- the following fall semester.

Engineering and Applied Science who would not otherwise be able to pur
such professional study. Available for undergraduate and graduate study.

American Association of Cost Engineers Scholarship (1977).—Establis
by American Association of Cost Engineers for scholarship assistance to a
time student, graduate or undergraduate, majoring in a curriculum which
cludes courses related to cost engineering.

Henry Harding Carter Scholarship (1896).—Established by Maria M. Ca
in memory of her husband to aid a deserving student who is preparing for
civil engineering profession. Available to students working toward the deg
of Bachelor of Science (Civil Engineering).

Henry Parsons Erwin Scholarship (1955).—Established by Helen B. Erwi
a memorial to her husband, a former Trustee of the University. A partial sch
arship for a student in Engineering and Applied Science.

Louis E. Giles Memorial Scholarships (1966).—Bequest of Susie E. Giles
honor and memory of her husband for scholarships to undergraduate and g
uate students in the School of Engineering and Applied Science requiring fin
cial assistance.

The George Hyman Construction Company Scholarships (1974).—Est
lished by the George Hyman Construction Company to aid deserving stude
preparing for the civil engineering profession. These partial tuition undergr
uate scholarships begin in the fall semester and extend for four years, provi
the holder maintains a *B* average based upon a full course load leading t
degree in civil engineering and continues to be in financial need.

National Fund for Minority Engineering Students Scholarship (1977).
Scholarship for minority students who require financial assistance and are
good academic standing.

George Washington University Board of Trustees Scholarships.—Full
partial tuition undergraduate scholarships which begin in the fall semester
extend for four successive academic years, provided the holder maintains
average, and continues to be in financial need. Candidates must plan to stu
curriculum leading to a Bachelor's degree.

FOR GRADUATE STUDENTS

Scholarships, Fellowships, Assistantships

The George Washington University program of financial assistance for grad
students includes assistantships, fellowships, traineeships, graduate scholars
research appointments, part-time employment, and loans. Application for
mission to graduate study is a prerequisite for consideration.

Application and correspondence concerning assistantships, fellowsh
traineeships, or graduate scholarships should be sent directly to the Dean of
School and addressed to George Washington University, Washington, D
20052. Unless otherwise specified, the application and supporting credent
should be submitted not later than February 1 preceding the academic
for which the award is made.

Frederick Albert and Alma Hand Britten Scholarships (1959).—See ab

American Association of Cost Engineers Scholarship (1977).—See above

Paul H. and Margaret M. deMaine Scholarships (1967).—Full and
scholarships for graduate students whose research involves the use of comput
Inquiries should be made to the Director of the Center for Academic and
ministrative Computing of the University.

E. Giles Memorial Scholarships (1966).—See above.

Delta Gamma Scholarship Endowment Fund (1968).—Established by Chapter of Phi Delta Gamma, national fraternity for graduate women. duate women students.

onal Science Foundation Graduate Fellowships.—Fellowships leading to degrees in the mathematical, physical, medical, biological, engineering, cial sciences, and in the history and philosophy of science; providing fees, and stipends. Open to students who have been admitted to grad- tus and who have completed less than one calendar year of graduate Applications should be made to the Fellowship Office, National Re- Council, 2101 Constitution Avenue, N.W., Washington, D.C. 20418.

rch Assistantships in Operations Research and Related Fields.—Avail- graduates, and to undergraduates on the junior and senior levels, in any of the University. Research Assistants are expected to work 20 hours a conducting research in support of an established research program or in mming or in conducting individual research on an approved research Stipends range up to $8,500, depending on the status of the student e tenure of the appointment (9–12 months). Further information and ions are available from Director, Institute for Management Science and ering, School of Engineering and Applied Science, George Washington ity, Washington, D.C. 20052.

rch Assistantships in Engineering Administration.—Available to gradu- in any Engineering Administration program. Research Assistants are d to work 20 hours a week conducting research in support of an estab- research program. Stipends range up to $8,500 depending on the status student and the tenure of the appointment (9–12 months). Further tion and applications are available from the Chairman, Department of ering Administration.

rch Scholar Assistantships, GWU—NASA-Langley Program.—See

ant Assistantships.—Available to graduate students and seniors in any o are interested in working with the student personnel program in Uni- residence halls. Specific duties vary with the position, but basically of counseling, advising student groups, and administration. Remunera- ludes full tuition and a furnished room for the academic year. All are part-time, and staff members must enroll as full-time students in granting programs. The application should be completed before March ther information may be obtained from the Office of the Director of g.

SPONSORED AWARDS FOR GRADUATE STUDY

ation regarding awards sponsored by foundations, professional and societies, industries, and others which may be used in support of grad- y is available at the Graduate Fellowship Information Center, 2025 N.W., for students enrolled at George Washington University. Informa- also available on distinguished programs such as the Rhodes, Marshall, Science Foundation, Fulbright, Rotary International, and Danforth as many others.

deadlines for application vary, qualified students should make inquiries advance of the year of planned graduate study.

LOAN FUNDS

Several loan funds are available to students in the University in accordan
with the qualifications specified by the donors. Two loan programs limi
to students in the School of Engineering and Applied Science are availab
Students should direct inquiries to and file applications with the Office of S
dent Financial Aid. Applications for the National Direct Student Loan sho
be filed no later than April 1 for the following academic year. Complete inf
mation is contained in the pamphlet, "Student Financial Aid," available in t
Office of Student Financial Aid, George Washington University, Washingto
D.C. 20052.

Warren Stickler Memorial Loan Fund (1966).—A fund established by t
Precision Measurements Association as a memorial to Warren Stickler is av
able to engineering students.

John Brewster Willis, Jr., Loan Fund in Mechanical Engineering.—Est
lished by Mrs. William L. Lane as a memorial to her nephew, John Brews
Willis, Jr. Available to Mechanical Engineering students (graduate or und
graduate) who are primarily interested in aeronautics.

Two short-term emergency loan funds are also available at the Universi
Information concerning these funds is available from the Office of Stude
Financial Aid.

STUDENT EMPLOYMENT

The University participates in the College Work-Study Program. Inqu
should be addressed to the Office of Student Financial Aid. In addition, t
Student and Alumni Career Services Office maintains a registry of both full-
and part-time positions available in the Washington area for undergraduate a
graduate students.

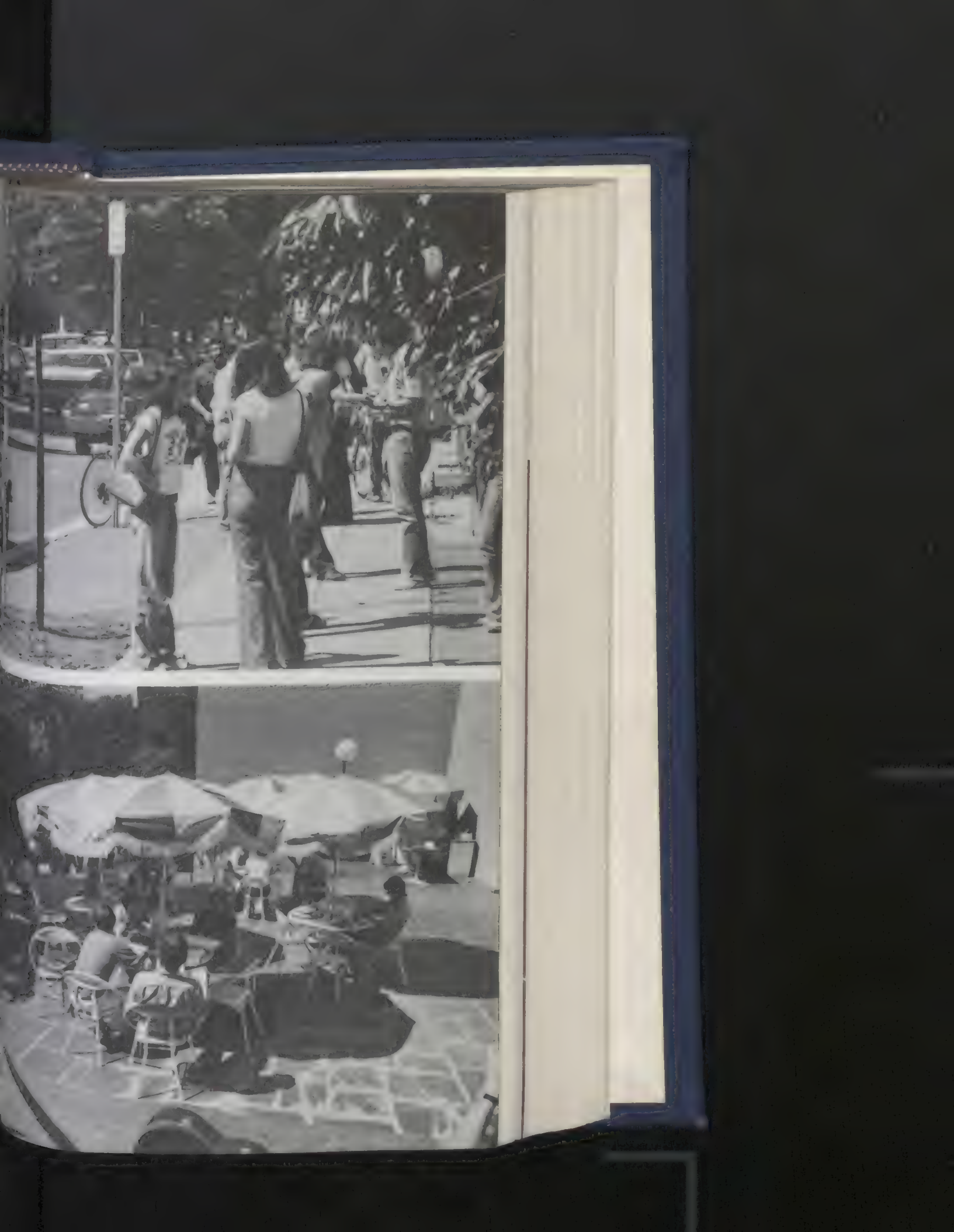
After registration, students may apply at the Student and Alumni Car
Services Office, Woodhull House, 2033 G Street, N.W., for interviews a
referrals to positions for which they are qualified.

INTERNATIONAL STUDENTS

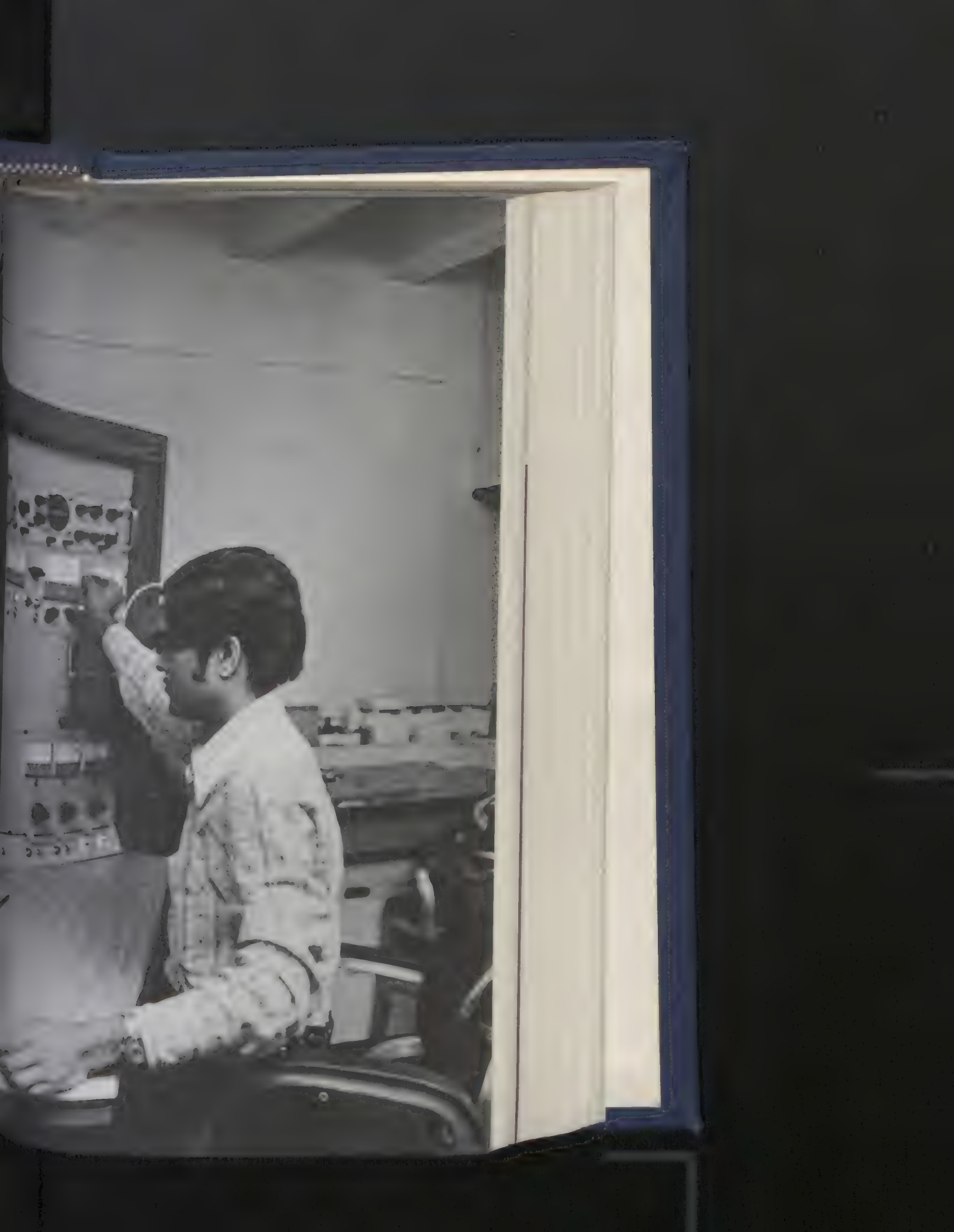
Undergraduate international students with proven financial need who have co
pleted one semester of full-time work (15 hours) at this University with a
average are eligible to apply for the Board of Trustees Scholarships. Schol
ships are awarded in the spring for the following academic year. See instructio
for applying for undergraduate financial aid, page 189.

Limited awards for graduate teaching assistantships and University fel
ships are the responsibility of the chairman of the department or dean of t
school in which the degree is to be earned. Work as a teaching fellow req
excellent knowledge of English—both spoken and written.

Long-term loan funds for undergraduate and graduate international stude
are limited in amount and are available only to those foreign-born persons w




G.W.U.





established resident status in the United States through the Immigration Naturalization Service.

dents who wish to study in the United States should have available suf- funds to cover expenses for one full year before attempting to enter a ge or university. The cost at this University for one academic year (Sep- r-May) is approximately $6,000. This estimate includes room and board, n, books, clothes, and incidental expenses; no travel, holiday, or medical ses are included.

Prizes

rman B. Ames Memorial Award.—Established by many friends of Pro- Ames and awarded annually to a graduating senior of the School of En- ing and Applied Science who is nominated by his fellow students as hav- ade significant contributions to the students in the School of Engineering pplied Science and to the School and University.

son Ames Activities Award.—A plaque awarded annually by Gamma Chapter to the senior in the School of Engineering and Applied Science the most outstanding record in activities for the entire period of attend-

rin Mahler Prize in Materials Testing.—A one-year membership in the ican Society for Testing Materials awarded to the upper division or grad- tudent in engineering who submits the best reports on tests in the mate- aboratories course with preference given to prestressed concrete tests.

ool of Engineering and Applied Science Distinguished Scholar.—An accorded annually by the Faculty of the School of Engineering and Ap- Science to the senior who graduates with the highest scholastic standing. dent's name is engraved on a plaque displayed in Tompkins Hall of En- ng.

Regulations

DENT ENROLLED in the School of Engineering and Applied Science is d to conform to the following regulations.

dent who withdraws or is suspended, or who, for any other reason, is istered at the University for one semester or more, may re-enter and e work only under the regulations and requirements in force at the return.

student knowingly makes a false statement or conceals material informa- an application for admission, registration card, or any other University nt, the student's registration may be canceled. If such falsification is ed after the student has established an academic record at the Univer- student may be subject to dismissal from the University. Such a stu-

dent will be ineligible (except by special action of the Faculty) for subsequ registration in the University.

ACADEMIC DISHONESTY

The University community, in order to fulfill its purposes, must establish a maintain guidelines of academic behavior. All members of the community a expected to exhibit honesty and competence in their academic work. Incom ing students have a special responsibility to acquaint themselves with, and mak use of, all proper procedures for doing research, writing papers, and taking ex aminations.

Members of the community will be presumed to be familiar with the propo academic procedures and held responsible for applying them. Deliberate failu to act in accordance with such procedures will be considered academic dishon esty. Acts of academic dishonesty are a legal, moral, and intellectual offens against the community and will be prosecuted through the proper University channels.

Copies of the University policy on academic dishonesty can be obtained from the following officers: all department chairmen, all academic deans, and the Vice President for Academic Affairs.

STUDENT CONDUCT

All students upon enrolling and while attending The George Washington Uni versity are subject to the provisions of the *Statement of Student Rights and Responsibilities* which outlines student freedoms and responsibilities of conduct, the Judicial System for Non-Academic Student Discipline, and other policies and regulations as adopted and promulgated by appropriate University authorities. Copies of these documents may be obtained at the Office of the Vice President for Student Affairs. Sanctions for violation of these regulations may include permanent expulsion from the University which may make enrollment in another college or university difficult. Regulations or requirements applicable only to a particular program, facility or class of students may not be published generally, but such regulations or requirements shall be published in a manner reasonably calculated to inform affected students.

CHANGES IN PROGRAM OF STUDY

A student may not make any changes in approved program of study without the approval of the Associate Dean. Requests for change in class registration must be made on a form provided in the School office.

During the seven days following the first day of classes of a semester, courses may be added to the student's program with the approval of the instructor, the faculty adviser, and the Associate Dean.

WITHDRAWAL

A student who withdraws or is otherwise absent from the University for a semester or more must apply for readmission. If readmitted, the student continues work under the requirements and regulations in force at the time of readmission.

plications for withdrawal from the University or for change in class sched-
ust be made in person or in writing to the individuals indicated below.
cation to an instructor is not an acceptable notice.

r Withdrawal

urses may be dropped by undergraduate and graduate students without
mic penalty only during the 28 days following the first day of classes,
he approval of the instructor, the student's adviser, and the Associate

Withdrawal

thdrawal from any course without academic penalty after the 28th day
ing the first day of classes of a semester may be granted with the ap-
of the instructor, the student's adviser, the chairman of the depart-
in which the student is enrolled, and the Associate Dean. Requests for
ithdrawal must be submitted to the Associate Dean's office on the
priate form and must be accompanied by a drop-add slip. Late with-
s may be granted only under the following conditions:

The request is made necessary by exceptional circumstances such as cer-
ified medical absence or forced absence caused by work-related require-
ments, and

As of the date of the request, the grades in all courses involved are *C* or
etter for graduate students, and *D* or better for undergraduate students.

cases, financial regulations governing withdrawal remain in full effect.

in Course Status

status of a course may not be changed from credit to audit or vice-versa
e 28th day after classes have started for the semester.

tuition is charged for courses dropped without the approval of the
e Dean. Such unauthorized withdrawal will result in the recording of a
grade for the course or courses. Permission to withdraw from the Uni-
will not be granted to a student who does not have a clear financial

CREDIT

given only after registration for a course and satisfactory completion
equired work, or upon the granting of advanced standing.

ing.—A person who has been admitted to the University may be regis-
th the permission of the instructor, as an auditor in a class (no academ-
). An auditor is not required to take active part or to pass examina-
student who takes a course as an auditor may not repeat it later for

e Sheet.—On request the Registrar will issue to undergraduate degree
s a balance sheet showing the amount of work completed and the re-
ts remaining to be met for the degree. A second balance sheet is is-
if the student changes major or degree objectives.

ission Transfer Credit

who plans to attend another institution and apply credit so earned
raduation from this University must first secure the written approval

of the adviser, the department chairman, and the Associate Dean, on a for
available in room 103, Tompkins Hall. In no event will credit in excess of wh
might be earned in a similar period in this University be recognized.

TRANSCRIPTS OF RECORD

Official transcripts of student records are issued on written request of the st
dent or former student who has paid all charges, including any student loa
installments, due the University at the time of the request. A fee of $2 is charge
for each transcript. When more than two transcripts are ordered at the sam
time, a $2 fee is charged for each of the first two transcripts and a $.50 fee
charged for each additional transcript. Partial transcripts are not issued.

CONTINUOUS REGISTRATION

Degree candidates are expected to maintain continuous registration until
degree requirements are satisfied. Students who have completed their cours
requirements (including the thesis) must maintain continuous registration b
paying the "continuous registration" fee (see page 185). By failing to regist
for one semester or more, the student breaks registration and must be read
mitted. The procedure for readmission to the graduate programs is the same
as that for undergraduates (see page 15.) A readmitted student is subject t
the regulations and requirements in force at the time of readmission.

Students must be registered during the summer if they are taking courses
are taking required examinations, are receiving guidance on theses or di
sertations, or are expecting to graduate at the end of the Summer Sessions

GRADUATION REQUIREMENTS

To be recommended by the faculty for graduation a student must have me
admission requirements of the School; completed satisfactorily the scholarsh
curriculum, residence, and other requirements for the degree for which the st
dent is registered; and be free from all indebtedness to the University. Reg
tration, either for course work or on the "continuous registration" fee basis,
required for the semester or summer session at the close of which the degr
is to be conferred.

Application for Graduation.—An "Application for Graduation" form m
be filed and the appropriate fee paid at the time of registration for the
semester or summer session of the senior or final year. Students completing
gree requirements during the Summer Sessions will be awarded diplomas
formal convocation) dated September 30, *provided* they have completed
degree requirements and have applied for graduation as a part of registra
for the Summer Sessions.

Attendance and Conduct.—The University reserves the right to refuse to
fer a degree upon a candidate whose attendance or conduct has been unsa
factory.

Student Records.—Information on the status of credit, transfer-of-cre
awards, balance sheets, and other information relating to graduation may
obtained in room 103, Tompkins Hall.

...on of Concentration Certificate.—Upon successful completion of the Mas-...egree the student, by means of a written request to the appropriate depart-...chairman, may obtain a certificate indicating the area of concentration.

THE LIBRARY

...udents registered in the University have the privilege of using the Uni-...y Library. Its stacks are open, and all students are welcome to browse. ...d denoting approved enrollment for the current semester must be pre-...d when books are borrowed for outside use.

...oan period for stack books is 14 days. A fine of 25 cents is charged ...on day a book is overdue. Any book which circulates is subject to recall ...Library if needed for reserve or other use. Reserve books must be used ...reserve reading room when the Library is open, except that they may be ...awn for overnight use beginning at 8:30 p.m. A fine of 50 cents is ...d for each hour or fraction thereof that a reserve book is overdue. ...s of a student are withheld until the library record is clear.

...tudents using the University Library are expected to be familiar with its ...d regulations, available at any of the Library's service desks.

MILITARY LEAVE

...nt called to active duty may be granted military leave for the period of ...duty, upon presentation to the Dean of a copy of military orders and ...on for such leave. The maintenance of "continuous registration" is not ...d of the student on military leave; however, the student must apply for ...sion to the University well in advance of the semester of expected re-...ayments for tuition and fees which are not refunded to the student at ...military leave is granted will be maintained as a deferred credit for the ...account and used upon return to the University.

UNIVERSITY POLICY ON THE RELEASE OF STUDENT INFORMATION

...ily Educational Rights and Privacy Act of 1974 applies to institu-...olicies governing access to and release of student education records ...ed by educational institutions which are recipients of federal funds. ...versity complies with this statute, which states, in part, that such insti-...ust:

...ord students access to education records directly related to them;

...er students an opportunity for a hearing to challenge such records as ...ccurate, misleading, or otherwise inappropriate;

...eive the student's written consent before releasing information from ...or her education records to persons outside the University, except as ...vided by the Act and except for directory information as indicated ...ow. Information may be furnished to a student's parents without such ...ten consent only upon certification of the student's financial de-...dency; and

4. Comply with a judicial order or a lawfully issued subpoena to release student's record, notifying the student of such action.

The University will release the following directory information upon reque name, local address; telephone number; name and address of next of kin; da of attendance; school, college, or division of enrollment; field of study; cre hours earned; degrees earned; honors received; participation in organizatio and activities chartered or otherwise established by the University (includi intercollegiate athletics); and height and weight of members of athletic team A student who does not wish such directory information released must written notice to this effect in the Office of the Registrar.

Copies of the University's full policy statement on the release of stude information may be obtained from the Office of the Registrar.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student fro the University, or from any class or classes, whenever, in the interest of student or the University, the University Administration deems it advis

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the r to modify or change requirements, rules, and fees. Such regulations shall into force whenever the proper authorities may determine.

RIGHT TO MAKE CHANGES IN PROGRAMS

The right is reserved by the University to make changes in programs witho notice whenever circumstances warrant such changes.

PROPERTY RESPONSIBILITY

The University is not responsible for the loss of personal property. A "Lost Found" Office is located on campus in the Safety and Security Office.

UNIVERSITY POLICY ON DRUGS

The University cannot condone violations of law, including violations of laws which proscribe possession, use, sale, or distribution of drugs. Member the academic community should know that administrative action, which include dismissal from the residence halls, revocation of other privileges suspension or dismissal from the University, may be taken in order to pro the interests of the University and the rights of others.

Consortium of Universities of the Washington Metropolitan Area, Inc.

NIVERSITIES IN WASHINGTON, D.C.—American University, Catholic Uni- of America, *George Washington University*, Georgetown University, and rd University—are associated in a Consortium through which they co- e the use of their respective facilities; Gallaudet College, Mount Vernon , and Trinity College are associate members of the Consortium. Stu- n approved programs leading to degrees in any one of these institutions e opportunity to select from the combined offerings of all the particular s which best meet their needs.

cipation is limited to campus degree candidates. The following, how- e excluded: students in Canon Law, Dentistry, Medicine, and Theology. dents are also excluded from participation, except for candidates for ree of Master of Laws at George Washington University and George- niversity.

ecial courses involving private instruction (as in music or art) or tutorial f a special fee is charged, this fee is not covered by the Consortium nt and must be paid by the individual student to the institution adminis- e course. A student interested in registering for Reserve Officer Train- ps (ROTC) courses should consult the Registrar at the institution in e student is enrolled.

nts are encouraged to study the announcements of programs of all the ing institutions. See pages 183–84 for more information concerning on for Consortium courses.

ration forms and instructions are available from the registrar and in 3, Tompkins Hall. Students register and pay tuition at their own institu- Consortium courses; course fees are payable to the visited institutions.

Center for Academic and Administrative Computing

ER FOR ACADEMIC AND ADMINISTRATIVE COMPUTING is located on the of Lisner Hall, 2023 G St., N.W. The computer and other opera- portive services are located on the first floor of Stuart Hall, 2013 G These facilities normally are available 24 hours a day, seven days a qualified faculty, staff, and students.

nter provides computational facilities, conducts seminars, consults and provides operational assistance as required. The Center IBM 370/148 (OS/VS1) central processing unit and a PDP 11 ter which provides terminal and card remote-job-entry to the There is a full range of compilers and application software packages. r programming courses are offered by the School of Government ss Administration, the Department of Statistics, and the School of and Applied Science. In addition, many other departments offer utilize the computer as a research adjunct to course work.

The Speech and Hearing Clinic

THE SPEECH AND HEARING CLINIC offers diagnostic and remedial work for ch
dren and adults with such communication difficulties as stuttering, lisping, co
palate speech, and cerebral-palsied speech; and with voice, articulatory, a
hearing problems. Diagnostic and remedial work is also available for perso
with nonstandard language usage due to such conditions as hearing loss, or
damage, mental retardation, and environmental factors.

Fees.—The fee for an initial evaluation is $35. Fees for additional speci
ized testing are dependent on the testing involved. The fees for individu
speech or hearing therapy range from $4 to $25 a session. Fees are reduce
for full-time students enrolled in the University and for persons receiving gra
therapy. Fees are payable at the Office of the Cashier.

The Reading Center

THE READING CENTER offers individual diagnostic and corrective services for
levels: primary, elementary, secondary, and adult. In addition, special readi
improvement classes are conducted for high school and college students as
as other adults.

A complete diagnosis includes psychological tests; vision, hearing, spe
nance, and spelling tests; and various types of reading achievement and
tude tests. Results are interpreted, and a written report is presented in
ference with the parents or the individual.

The special reading improvement classes for high school students, coll
students, and other adults are offered throughout the year at stated inter
Emphasis is placed on improvement of vocabulary, speed, comprehension, a
study skills. Instruction in spelling is also provided as needed. Mechanical
such as the tachistoscope, rate accelerator, and controlled reader are ava
for increasing speed of comprehension.

Fees.—The fee for individual diagnosis is $125; for individual instruct
$15 a lesson; for semi-individual instruction, $11 a lesson; for instruction
small groups, secondary level, $250 for 15 two-hour lessons. Reading sk
(15 two-hour sessions) are offered for adults, $225; for full-time George
ington University students and alumni, $90. Full-time employees may ob
the Center regarding special fees. All fees are payable in advance at the
ing Center.

Reading instruction is required for first-year undergraduate students
insufficient reading skills who are taking English 9.

Veterans Benefits

THE VETERANS COUNSELOR IN Luther Rice Hall, 2121 Eye St., N.W., a
students entitled to educational benefits as veterans, widows, or children

ised or totally disabled veterans with any problems which may arise con-
ng their benefits. This Office also processes certification of enrollment
ttendance to the Veterans' Administration so that monthly allowances will
id.

hen feasible, students entitled to benefits as veterans or dependents of vet-
should consult with the veterans counselor prior to submitting application
e Veterans' Administration. All such students should obtain the instruction
issued by the veterans counselor, which sets forth requirements to be
d before certification of enrollment can be made to the Veterans' Admin-
on, and which includes other information of general interest.
e Veterans' Administration is at 941 N. Capitol St., N.E., Washington,
20421.

"For Further Information"

RTHER INFORMATION" is a student-operated undergraduate academic re-
center. It is located on the third floor of the Library, by the stacks, in
306/307. "For Further Information" serves undergraduates as a clear-
e for academic information and as a center for peer advising. The
staffed by undergraduates who provide assistance to students seeking
e on matters ranging from schedule planning and course selection to
lls.

g fall and spring registration, peer advisers are also available on the first
Monroe Hall to offer new and returning students individual academic
and registration assistance.

Alumni Associations

THE GENERAL ALUMNI ASSOCIATION

CTIVES OF THIS ASSOCIATION are to unite the graduates who wish to
hemselves for charitable, educational, literary, and scientific purposes,
mote the general welfare of the University.
members are those who have enrolled in any school of the Uni-
who have left the University in good standing, or any person who is
n a member of the teaching, research, or administrative staff of the
or of the Board of Trustees of the University. Active members are
are life members of the George Washington University General
sociation or the Alumni Association of any school of the University,
ent contributors to the George Washington University Fund.
ni are urged to keep the Alumni Office informed of changes of ad-
ccupation and to supply information with regard to their fellow
e Office is located in Alumni House, 714 21st St., N.W., George
University, Washington, D.C. 20052.

THE ENGINEER ALUMNI ASSOCIATION OF THE GEORGE WASHINGTON UNIVERSITY, INC.

The Engineer Alumni Association was organized in 1936 and incorporated [illegible] 1963 to coordinate with the General Alumni Association those activities of [illegible] mary interest to the engineering alumnus. The objectives of the Association [illegible] to provide the link between the graduates and faculty of the School, to help promote the general welfare of the School of Engineering and Applied Science and of the University, to foster activities of the engineering organizations recognized by the University, and to advance the engineering profession in general.

In 1966 a board of directors, comprised of 15 elected members of the Association and the Engineers' representatives serving on the Governing Board of the General Alumni Association, was established. The membership of the board of directors was expanded in 1969 to include the Director of Alumni Relations and one representative each from the faculty of the School and the student body. Members of the Association are elected each year, prior to the June meeting, to three-year board memberships as listed below:

Term Expiring 1978	*Term Expiring 1979*	*Term Expiring 1980*
Issa Khozeimeh	Wesley G. Harris	Richard N. Davis
Eric S. Mendelsohn	Robert C. Haven	Pastor Farinas
Dudley J. Schwartz	Norris C. Hekimian	Richard J. Pronk
John A. Sporidas	Maureen R. Supple	Harold Sangester
	John L. Wolfgang	

General Alumni Association Representatives	*Student Representative*	*Regional Director*
Douglas L. Jones	M. P. Hubbard	William H. Holt
John R. Manning	*Faculty Representative*	*Past President*
Edward A. Wareham III	Galip M. Arkilic	John L. Wolfgang

At the June meeting each year the board elects officers for its operation in the upcoming year. The officers for the year 1978–79 are

President.—Richard J. Pronk, B.S. in Engr. 1958; 12702 Bermuda Lane, Bowie, Md. 20715

Vice President.—James Sinsabaugh, 1101 Oakcrest Rd. S., Arlington, 22202

Secretary.—Pastor Farinas, M.E.A. 1972; 5 Bethayres Ct., Rockville, 20855

Treasurer.—Eric S. Mendelsohn, B.S.C.E. 1967; 7728 Warbler Lane, Derwood, Md. 20855

STUDENT LIFE

OFFICE OF THE VICE PRESIDENT FOR STUDENT AFFAIRS develops student ervices, policies, and procedures to complement the University's formal ction program. These activities are implemented through the offices of oyd Heck Marvin Center, Counseling Center, Dean of Students, Educa- Opportunity Program, Housing, International Students, Student Activities, t and Alumni Career Services, and Student Health Service.

Student Services

OFFICE OF THE DEAN OF STUDENTS

ffice of the Dean of Students provides counseling and information for s and assists in program development for the Division of Student Af- he coordinator for Services for Handicapped Students works to assure e special services necessary for handicapped students to participate their academic programs are provided for them through University nunity resources. Staff members are well-informed on University poli- the various student services provided on campus, enabling them to pro- errals and answers to many questions concerning general student life. letters of recommendation for students applying to graduate and pro- schools can be obtained from this office. The Dean of Students ith the Adviser to International Students, the Director of the Counsel- r, the Director of the Educational Opportunity Program, the Director udent Health Service, and the Director of the Student and Alumni ervices Office in the implementation of their programs.

HOUSING

information concerning the University's residence halls is available Director of Housing, George Washington University, Washington, 52. Information concerning off-campus housing near the University tained at this Office.

on to the University does not include a room reservation. The stu- eceive, with his notification of acceptance, University residence hall n, an application for residence hall space, and a declaration of intent the University. The application for residence hall space must be ed by a $100 *nonrefundable deposit*. The housing deposit is credited first semester's room charge. Rooms are leased for the academic ease payment must be made by June 16 for the fall semester.

sidence Hall Rates Per Person For Two Semesters*

all
oom $1,216
om 1,160

ll prices and allocation and food service prices subject to change.

For Women:

Strong Hall
- single room
- double room
- triple room

For Men and Women:

Crawford Hall (limited to sophomores, juniors, and seniors)—
- double room

Francis Scott Key Hall (limited to juniors and seniors):
- apartment for two persons
- apartment for three persons 1,296 or

Mitchell Hall (limited to sophomores, juniors, and seniors)—
- single room

Madison Hall
- double room
- triple room

Thurston Hall
- double room, triple room, large room for four
- suite for six, small room for four

Food Service

Resident freshmen and sophomores are required to participate in the food service plan. Freshmen must participate in the seven-day, 19 meals per week plan at the rate of $860* for the academic year. Sophomores may elect either the 19-meal plan or an "any 14 meals" per week plan for $810* for the academic year. Each plan, plus an additional "any 10 meals" per week plan at $68[illegible] the academic year, is optional for junior, senior, and graduate students. Fo[illegible] service payment does not cover University intersession or vacation per[illegible] All meal cards admit bearer to dining rooms in Thurston and Mitchell H[illegible] and the second floor contract dining room in the Cloyd Heck Marvin Ce[illegible] Meal cards may also be used on a cash equivalency basis in the Marvin Ce[illegible] first floor cafeteria and Rathskeller.

Students who observe the Jewish dietary laws can write to make arrangements with the George Washington University Housing Office regarding the B'rith Hillel Foundation Kosher Meal Plan.

Munson Hall Apartments

Munson Hall is a University owned and operated apartment house con[illegible] 15 one-bedroom and 54 efficiency apartments. Full-time graduate and ma[illegible] students are eligible to reside in Munson Hall. Those wishing to apply for apartment should contact the Housing Office for a waiting list application. leases are for 12 months.

* Residence Hall prices and allocation and food service prices subject to change.

and Guthridge Apartments

partment houses are University-owned, commercially operated buildings the campus area. Each building contains efficiency and one-bedroom hich are rented only to full-time graduate students on an "as available" Referrals to the resident managers of these buildings are made by the r of Housing when notice is received of vacancies. Leases are executed e respective management companies and are on a month-to-month

EDUCATIONAL OPPORTUNITY PROGRAM

ducational Opportunity Program is designed to provide selected District mbia high school graduates and other qualified District residents with al and personal support as well as academic assistance to help students degree work at George Washington University. The Program office ed at 2127 G Street, N.W.

CLOYD HECK MARVIN CENTER

oyd Heck Marvin Center serves as the campus community center, pro- services, conveniences, and recreational and social opportunities for stu- faculty, staff, alumni, and guests. Its wide range of facilities provides ing for a variety of programs conducted by the University Program by the departments of drama, dance, and music; and by other student culty organizations.

Center Governing Board, representative of all segments of the Univer- mmunity, plays an important role in the day-to-day functioning of the This Board works closely with the full-time staff in the development cedures and policies which provide a framework for the Center's opera-

STUDENT HEALTH SERVICE

tudent Health Service is an outpatient clinic located at 935 22nd St., n the H.B. Burns Memorial Building).

icians and physician assistants are available by appointment from 9 a.m. 5 p.m., Monday through Friday. In addition, physician assistants are le for primary care to walk-in patients Monday through Friday from 5 to p.m., on Saturday from 9 a.m. to 12 noon, and on Sunday from 10 a.m. noon.

serious emergencies occurring during hours when the Student Health e is closed, students may go to the Emergency Room of the University l for treatment. This arrangement is for emergency care only, and all the responsibility of the student.

ents must be currently enrolled on campus in the University to receive ent at the Student Health Service. Students who so desire may engage ns and nurses of their own choice, but such students will be responsi- the fees charged. The bills incurred from all services rendered outside tudent Health Service (for example, X-ray work, laboratory work, and to specialists or other outside physicians) are the responsibility of the

Health and Accident Insurance

The Student Health Service has arranged for and endorsed group health
accident insurance, on an elective basis, for those students who do not h
other coverage. Interested students should consult the Student Health Serv
office.

COUNSELING CENTER

The Counseling Center works to enable students to overcome obstacles wi
hamper learning. The Center's services are offered to students and staff, and
clude (1) resolution of the individual's educational, vocational, or personal c
flicts through short-term individual or group counseling, vocational testing,
study skills remediation; (2) training of graduate students, resident assistan
and paraprofessionals; (3) consulting on mental health topics; and (4)
velopment of new methods and programs to aid student growth, such as cou
seling through written communication, videotaped counselor skills training, a
interpersonal skills workshops.

The Center administers the Miller Analogies Test, admissions testing, a
special assessments for business and industry. Through its Office of Communi
Services, the Counseling Center also provides vocational counseling and educ
tional programs to the greater Washington community.

Students may request a cost-free interview from 9 a.m. to 4:30 p.m., Monda
through Thursday, and 1 to 4:30 p.m. on Fridays. If the student decides t
continue, a fee of $5 for full-time students ($15 for part-time students) pe
appointment will be charged for short-term treatment. If a test battery i
called for, an additional $12 materials fee will be charged. However, if finan
cial need is a factor, fee adjustments can be made.

The Counseling Center is located at 718 21st St., N.W.

INTERNATIONAL STUDENT ADVISING OFFICE

Located in the International House at 2129 G St., N.W., the staff of the Inter
national Student Advising Office provides advising and counseling in matters
of personal and academic concern and visa regulations. This office is also
consultation, information, and resource center for the University's interna
tional population.

STUDENT AND ALUMNI CAREER SERVICES OFFICE

The Career Services Office provides career guidance and placement to GW stu
dents and alumni. Some of the specific services are: full-time and part-time job
vacancy lists, career counseling, programs on job-seeking skills, a full library of
literature on occupations and employers, and current information on govern
ment employment, including testing dates and application forms. Seniors and
alumni may also use the office to establish credential files for application to
graduate schools and for employment. The office is open from 9 a.m. to 5 p.m.
Monday through Friday, with evening hours scheduled during each semester.
It is located at Woodhull House, 2033 G St., N.W.

RELIGIOUS LIFE

University recognizes the contribution that religion makes to the life of its
nts and encourages them to participate in the various religious organiza-
s of their own choice. Catholic, Jewish, and Protestant bodies sponsor
ous groups and form a link between the University and the religious com-
nity. The advisers of the religious organizations are available for counsel-

eligious services in various traditions are provided regularly for the Univer-
community as announced.

DAVIS-HODGKINS HOUSE

Davis-Hodgkins House is the student center of the School of Engineering
Applied Science, providing lounges, reading rooms, and student organiza-
offices. The House provides convenient, comfortable facilities for the ex-
ge of ideas and good fellowship.

Student Activities

offices of the Vice President for Student Affairs, the Dean of Students,
Director of the Cloyd Heck Marvin Center, and the Director of Student
ities are responsible for all co-curricular phases of student life.

STUDENT ACTIVITIES OFFICE

Student Activities Office assists individual students and organizations in pro-
development, campus leadership training, and participation in special proj-
both within the University community and the community at large. The
serves as a clearinghouse for activities information, registers and advises
nt organizations, and informs the University community of activities and
ams through a variety of weekly, monthly and annual publications. The
nt Activities Office is also responsible for coordinating the orientation pro-
for new students. Students who want to participate in the extracurricular
of University life should acquaint themselves with the facilities and staff
Student Activities Office.

UNIVERSITY COMMITTEES AND ORGANIZATIONS

t involvement is a motivating force in the governance of the University
the committee structure. This involvement has helped develop policies
grams beneficial to the student population and to the total University
nity. The numerous committees on which students may serve are de-
in the *Student Handbook*, which is available in the Student Activities

Student Government

The George Washington University Student Association (GWUSA) is c
prised of all full-time and part-time graduate, professional, and undergradu
students who are registered for academic credit on campus. A body of elec
and appointed individuals is responsible for representing the interests of stud
at the University. Further information can be obtained from the Student G
ernment offices in the Marvin Center.

THE ENGINEERS' COUNCIL

The Engineers' Council is the student governing body for the School of En
neering and Applied Science, composed of elected representatives from ea
level class and from the graduate student body, from each student organizat
in the School, and the House Manager of the Davis-Hodgkins House. T
purpose of the Council is to provide liaison between the student body of t
School and the Faculty, Administration, and Student Government of the U
versity in all matters affecting the general interests and welfare of the stude
body, the School, or the University. The Council is maintained financially
the Engineers' Council fee paid by each student in the School, and sponso
the Engineers' Mixers and the Engineers' Ball. Council meetings are open
all students in the School.

STUDENT ORGANIZATIONS

Students are encouraged to become involved with existing student organizati
or to initiate their own. The *Student Handbook*, available in the Student Acti
ties Office, lists approximately 150 organizations under the following categories
Academic; Professional; Honorary; International; Cultural; Political Interest
Service; Special Interest; Sports, Hobbies and Recreation; Religious and Mo
tative; and Social Fraternities and Sororities. More complete information abo
these organizations can be obtained through the Student Activities Office.

The following is a representative list of organizations active at the University
during 1978–79 of particular interest to students in the School of Engineering
and Applied Science. More complete information on these and other organiza
tions is available at the Student Activities Office.

Honor Societies

Sigma Xi.—A national scientific honor society, the purpose of which is to
encourage original investigation in science, pure and applied. Outstanding
graduate students in the sciences are eligible for full membership, and under
graduates who have shown marked ability in research may be elected to asso
ciate membership.

Delta Sigma Rho-Tau Kappa Alpha.—A national forensic society.

Mortar Board.—A national society for juniors and seniors, stressing leader
ship, scholarship, and service.

...cron Delta Kappa.—A national society emphasizing leadership in extra-...ular activities.

...Eta Sigma.—A national society established to encourage and reward ...scholarship and attainment, membership in which is limited to those fresh-... who attain a scholastic average of at least 3.50 or the equivalent.

...a Tau.—A national engineering honorary fraternity, the purpose of ... is to recognize scholarship and professional attainment.

... Beta Pi.—A national engineering honorary fraternity, the purpose of ... is to recognize distinguished scholarship and exemplary character.

...tional and Cultural Exchange Organizations

...ian Society, Friends of Canada, International Students' Society, Latin ...an Association, Libyan Student Organization, Organization of Arab Stu... Polish American Youth Club, Students' Cultural Association of India, ... Affairs Society.

...ing Arts

... Dance Production Groups; Student Productions; University Chamber ... Chorus, Orchestra; University Program Board; University Theater. A ... of programs is presented by these groups throughout the academic year.

...l Interest Organizations

...pon Society, GW College Young Republicans, GW Young Democrats, ... Americans for Freedom, Young Socialist Alliance.

...onal Organizations

...rican Society of Civil Engineers (Student Chapter).
...rican Society of Mechanical Engineers (Student Chapter).
...te of Electrical and Electronic Engineers (Student Chapter).
... Tau (Gamma Beta Chapter).—A national professional (engineering) ...y. Membership by invitation to outstanding students who have com... successfully at least the first year in the School of Engineering and Ap...ience.

...ions and Communications

...rry Tree (yearbook), *G.W. Forum* (student-faculty journal), *Potomac* (publication of Consortium graduate students), *The Rock Creek* (liter...azine), *Student Handbook*, *This Month* (listing of major cultural ... the Washington area), *Campus Calendar* (biweekly listing of sched...nts), *The University Hatchet* (semi-weekly newspaper), WRGW (Uni...adio station), 676-NEWS (recorded telephone message of daily Uni...tivities).

... and Meditative Organizations

...dent Union, B'nai B'rith Hillel Foundation, Christian Science Or..., Eastern Orthodox Fellowship, Eckankar Campus Society, Inter-

Varsity Christian Fellowship, Lutheran Student Association, Newman Fo
tion, Psychegenics Club, Religious Society of Friends, Student Interna
Meditation Society, Unitarian-Universalist Club, United Christian Fellow
Wesley Foundation.

Service Organizations

Circle K, Ecology Action, GW Medical Aid, Project Share, St. Elizab
Hospital Project, SERVE, Student Housing Project, Student Volunteer A
Council.

Social Fraternities

Delta Tau Delta, Kappa Sigma, Sigma Alpha Epsilon, Sigma Chi, Sigma
Sigma Phi Epsilon, Tau Kappa Epsilon. The Interfraternity Forum coordin
the interest and concerns of some of the fraternities on campus.

Social Sororities

Delta Gamma, Delta Sigma Theta, Kappa Kappa Gamma, Phi Sigma Sig
A Panhellenic Council includes representatives of sorority chapters at the U
versity.

Special Interest and Advocate Groups

Black Peoples' Union, Jewish Activist Front, Legal Aid Bureau, Peoples' Unio
D.C. Public Interest Research Group (GW Chapter), Student Recruitme
Committee.

Sports, Hobbies, Recreational Organizations

Amateur Radio Club, Cheerleaders, Collegiate Bowling Club, Folkdance Cl
Hockey Club, Military Collectors, Philubious Eggworte (music).

ATHLETICS AND INTRAMURAL SPORTS

The University is a member of the National Collegiate Athletic Associati
the Eastern College Athletic Conference, the Association for Intercollegiate
Athletics for Women, and the Eastern Association of Intercollegiate Athleti
for Women. Its teams participate against major universities throughout t
Midwest and Eastern Seaboard. The intercollegiate programs for men a
women offer such sports as basketball, baseball, soccer, tennis, golf, wrestlin
crew, swimming and diving, squash, badminton, volleyball, and gymnastics.

The University offers a broad program of intramural sports activities for bo
men and women.

MAJOR PROGRAM EVENTS

Art Exhibits.—The work of locally, nationally, and internationally know
artists is shown in monthly exhibits in the Dimock Gallery in Lisner Au
torium and in the art gallery of the Cloyd Heck Marvin Center. With
cooperation of the Curator of Art, an annual student art exhibit is presen

ncert Series.—The Department of Music presents a series of concerts fea- faculty, guest, and student artists throughout each year.

ce.—The GWU Dance Company presents major concerts, informal performances, experimental events, television appearances, and lecture- strations. Students may audition to become company members and have portunity to choreograph, perform, and gain experience in the technical of dance productions.

rnational Programs.—The International Student Society presents an an- International Dinner in cooperation with foreign embassies and interna- restaurants. Other programs include regular forums and speakers on tional topics.

hestra and Chorus Concert Series.—The University Orchestra and Chorus o facets of the lively arts available to students either as credit courses or acurricular activities. The Chorus presents major performances to the ity community three or four times a year, including regular winter and concerts. The University Orchestra presents several performances an-

ram Board Series.—The University Program Board regularly sponsors activities, films, lectures, and special events.

reation Program.—The new Charles E. Smith Center for Physical Educa- Athletics offers many facilities for student use. The University Recrea- ssociation and the Department of Human Kinetics and Leisure Studies a wide variety of sports and recreational activities and special events students.

ter.—The University Theater produces four or five major plays and during the year on the new proscenium/thrust stage in the Dorothy Marvin Theatre or in Lisner Auditorium. Additional works, including and experimental plays, are produced in a more intimate studio theater. have the opportunity to participate in all aspects of theater and may credit toward their B.A. or M.F.A. degrees for some of their production

THE UNIVERSITY

History and Organization

THE GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Col
bian College in the District of Columbia. The name of the institution
changed in 1873 to Columbian University and in 1904 to The George
ington University. The debt of the University to George Washington,
name it bears, is large but intangible.

George Washington, as President and as private citizen, had urgently in
upon the establishment of a National University in the Federal City. There
hoped that, while being instructed in the arts and sciences, students from
parts of the country would acquire the habits of good citizenship, throwing
local prejudices and gaining at first hand a knowledge of the practice, as
as the theory, of republican government. To further the materialization of
hopes, Washington left a bequest of fifty shares of The Potomac Company
"towards the endowment of a University to be established within the limits
the District of Columbia, under the auspices of the General Government,
that government should incline to extend a fostering hand towards it." The
Congress never extended "a fostering hand." The Potomac Company passed
out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a mis
missionary urge and the need for a learned clergy, a group of dedicated min
isters and laymen sponsored a movement for the establishment of a college
the District of Columbia. Inspired largely by the zeal and energy of the Rev
erend Luther Rice, they raised funds for the purchase of a site and petitioned
Congress for a charter. After much delay and amendment, Congress granted
a charter which was approved by President Monroe on February 9, 1821.
safeguard the College's nonsectarian character it provided "that persons of
every religious denomination shall be capable of being elected Trustees, and
shall any person, either as President, Professor, Tutor or pupil, be refused
admittance into said College, or denied any of the privileges, immunities or
advantages thereof, for or on account of his sentiments in matters of religion

During the entire time when the institution was known as Columbian C
its activities were centered on College Hill, a tract of forty-six and a half
between the present Fourteenth and Fifteenth Streets and extending north
Florida Avenue to somewhat beyond Columbia Road. The Medical School
was located downtown. For the better part of the Columbian University

ldings of the University were situated along H Street between Thirteenth
teenth Streets.
ng the last half century the University's present plant has been developed
section of the old First Ward familiarly known as "Foggy Bottom," be-
Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue.
rea is not without its reminders of historic interest to the University.
ent Monroe, who signed the Charter, lived at 2017 Eye Street; the first
ent of the Board of Trustees, the Reverend Obadiah B. Brown, was for
s the pastor of a church at Nineteenth and Eye Streets, and Washington
ated Twenty-third and E Streets as the site of the National University
ed to see established.
University as it is now organized consists of Columbian College of Arts
ences (undergraduate); the Graduate School of Arts and Sciences; the
ional schools, which include the National Law Center and the schools
icine and Health Sciences, Engineering and Applied Science, Education,
ment and Business Administration, and Public and International Affairs;
llege of General Studies; the Division of University Students; the Divi-
Experimental Programs; and the Summer Sessions.
George Washington University is privately endowed and is governed by
d of Trustees of which the president is an *ex officio* member.

The University Libraries

ary collections of the University are housed in the University Library
eral library of the University) and in the libraries of the Institute for
iet Studies, the National Law Center, and the School of Medicine and
ciences.
collections contain approximately 750,000 volumes, to which are
me 40,000 volumes a year. Endowments supplementing the Univer-
opriation provide books in the fields of American civilization, Ameri-
ature, foreign service, history, public finance, and the social sciences,
from many sources have enriched the collections. The Libraries cur-
eive 7,800 periodicals.
ation concerning the use of the libraries may be obtained at the
rvice desks.
rary is administered for the curricular, reference, and recreational
interests of the students. Instruction in the use of the library is given
ference librarians upon request. The library endeavors to assist stu-
all members of the University to use the rich library resources of
n and the unusual opportunities they offer for extensive research.
y loan arrangements are maintained with other libraries in the city
ghout the United States.
dent has access to the Library of Congress, the Public Library of
t of Columbia and its branches, and many of the special collections
rnment departments. Graduate students at George Washington Uni-
, upon application, be issued a Consortium library card which per-
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FACTS ABOUT GEORGE WASHINGTON UNIVERSITY

General Information	Private, nonsectarian, coeducational founded 1821
Location	Washington, D.C., bounded by Pennsylvania Avenue and 19th, F, and 24th Streets, N.W.
Number of On-Campus Students	8,273 full-time; 8,094 part-time (equivalent to 11,544 full-time students altogether)
Geographical Origin of Students	50 states, District of Columbia, 120 countries
Number of Full-time Faculty	1,000 (81% with doctoral degrees)
Number of Part-time Faculty	455 (includes some of the most distinguished men and women in Washington)
Residence Hall Space	2,184
Room and Board	Cost varies from $1,800 to $2,150 for the academic year (see pages 203–204)

Undergraduate majors: Accounting, American Civilization, American Literature, Anthropology, Applied Mathematics, Applied Statistics, Art History, Biology, Botany, Business Administration, Cartography, Chemistry, Chinese Language and Literature, Civil Engineering, Classical Archeology and Anthropology, Classical Archeology and Classics, Classical Humanities, Computer Science, Dramatic Art, East Asian Studies (China or Japan), Economics, Electrical Engineering, Fine Arts, Elementary Education, English Literature, Environmental Studies, French Language and Literature, Geodesy, Geography, Geology, Germanic Languages and Literatures, History, Human Kinetics and Leisure Studies, International Affairs, Journalism, Judaic Studies, Latin American Studies, Law Enforcement, Mathematical Statistics, Mathematics, Mechanical Engineering, Medical Technology, Middle School Education, Music (Applied, History and Literature, Theory), Nursing Anesthesia, Nurse Practitioner Program, Oceanography, Philosophy, Physician's Assistant Program, Physics, Political Science, Premedical, Psychology, Public Affairs, Radiologic Sciences and Administration, Religion, Russian Language and Literature, Russian Literature and Culture—in Translation, Secondary Education, Sociology, Spanish American Literature, Spanish Language and Literature, Speech Communication and Broadcasting, Speech Pathology and Audiology, Urban Affairs, Zoology.

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CHOOL OF ENGINEERING AND APPLIED SCIENCE, 1884

CHOOL OF EDUCATION AND HUMAN DEVELOPMENT, 1907

CHOOL OF GOVERNMENT AND BUSINESS ADMINISTRATION, 1928

CHOOL OF PUBLIC AND INTERNATIONAL AFFAIRS, 1928

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UMMER SESSIONS, 1916

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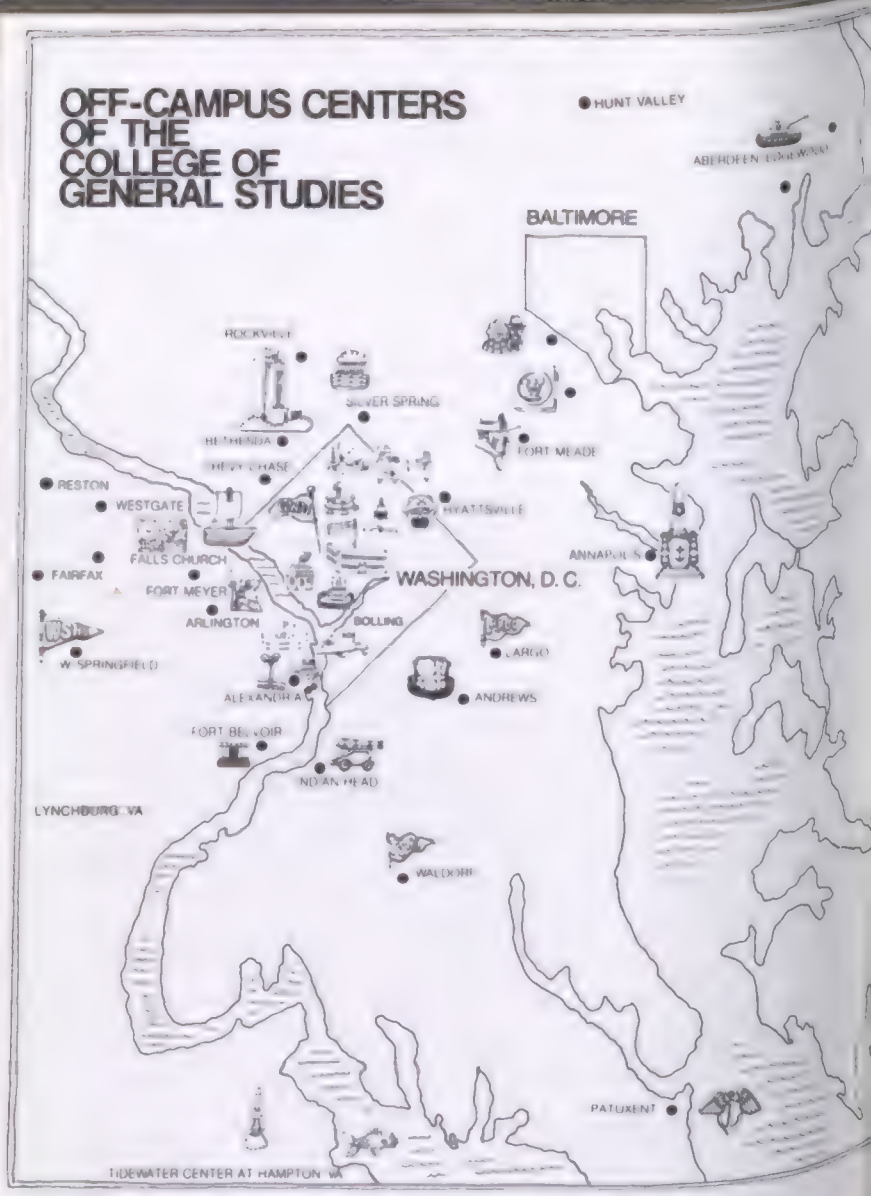
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18	19	20	21	22	23	24
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APRIL 1979

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15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

MAY 1979

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27	28	29	30	31		

JUNE 1979

S	M	T	W	T	F	S
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24	25	26	27	28	29	30

JULY 1979

S	M	T	W	T	F	S
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8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30	31				

1978 FALL SEMESTER

August 21–September 7	Off-campus registration† (days of registration and beginning classes will be announced in the *Off-Campus Schedule of Classes*)
	Application for February graduation due as part of registration.
‡August 31–September 2	Registration on campus† *Thursday–Saturday*
	Application for February graduation due as part of registration
September 4	Labor Day (holiday) *Monday*
September 5	On-campus classes begin *Tuesday*
September 9	Off-campus faculty meeting *Saturday*
September 14	Off-campus classes begin *Thursday*
October 9	Columbus Day—no off-campus classes *Monday*
November 10	M.S. in Administration Field Examinations *Friday*
November 17	D.Sc. dissertations of February candidates due *Friday*
November 22	Thanksgiving recess begins after last class *Wednesday*
November 27	Classes resume *Monday*

* Off-campus courses organized at any time.

† Application for Master's Comprehensive Examinations is the student's responsibility and must be made when registering for last courses required for degree.

‡ Hours of registration will be announced in the *Schedule of Classes*.

December 1	School of Engineering and Applied Science Master's theses of February candidates due *Friday*
December 5	Last day of campus classes *Tuesday*
December 9	M.A. in Education Comprehensive Examinations *Saturday*
December 11–20	Campus examination period *Monday–Wednesday*
December 22	Last day of off-campus classes *Friday*
January 2	Master's Theses (other than those in the School of Engineering and Applied Science) of February candidates due *Tuesday*

1979 SPRING SEMESTER

January 2–15	Off-campus registration* (days of registration and beginning classes will be announced in the *Off-Campus Schedule of Classes)*
	Applications for May graduation due as part of registration
†*January 11–13*	Registration on campus* *Thursday–Saturday*
	Applications for May graduates due as part of registration
January 15	On-campus classes begin *Monday*
January 22	Off-campus classes begin *Monday*
February 19	Winter Convocation (holiday) *Monday*
March 23	D.Sc. dissertations of May candidates due *Friday*
April 6	School of Engineering and Applied Science Master's theses of May candidates due *Friday*
April 13	M.S. in Administration Field Examinations *Friday*
April 16	M.S. in Administration theses of May candidates due *Monday*
April 20	Last day of campus classes *Friday*
April 21	M.A. in Education Comprehensive Examinations *Saturday*
April 26–May 5	Campus examination period *Thursday–Saturday*
April 30	Last day of off-campus classes *Monday*
May 6	Commencement *Sunday*

1979 SUMMER SESSIONS

There are two seven-week sessions and one fourteen-week session. Days of registration and beginning classes will be announced in the *Off-Campus Schedule of Classes.*

tion for Master's Comprehensive Examinations is the student's responsibility and must be
registering for last courses required for degree.
registration will be announced in the *Schedule of Classes.*

THE UNIVERSITY

HISTORY

GEORGE WASHINGTON UNIVERSITY had its beginning in 1821 as The Columbi
College in the District of Columbia. The name of the institution was change
in 1873 to Columbian University and in 1904 to The George Washingto
University. The debt of the University to George Washington, whose name
bears, is an intangible one.

George Washington, as President and as private citizen, had urgently insiste
upon the establishment of a National University in the federal city. There h
hoped that, while being instructed in the arts and sciences, students from a
parts of the country would acquire the habits of good citizenship, throwing o
local prejudices and gaining at first hand a knowledge of the practice, as wel
as the theory of republican government. To further the materialization of hi
hopes, Washington left a bequest of fifty shares of The Potomac Compan
"towards the endowment of a University to be established within the limits o
the District of Columbia, under the auspices of the General Government, if
that government should incline to extend a fostering hand towards it." Th
Congress never extended "a fostering hand." The Potomac Company passe
out of existence, and Washington's bequest became worthless.

Fully conscious of Washington's hopes, but motivated primarily by a gro
missionary urge and the need for a learned clergy, a group of dedicated m
isters and laymen sponsored a movement for the establishment of a college
the District of Columbia. Inspired largely by the zeal and energy of the Re
erend Luther Rice, they raised funds for the purchase of a site and petitione
Congress for a charter. After much delay and amendment, Congress grante
charter which was approved by President Monroe on February 9, 1821. To saf
guard the College's nonsectarian character it provided "That persons of eve
religious denomination shall be capable of being elected Trustees; nor shall a
person, either as President, Professor, Tutor or pupil, be refused admittance
into said College, or denied any of the privileges, immunities, or advantage
thereof, for or on account of his sentiments in matters of religion."

During the entire time when the institution was known as Columbian Colleg
its activities were centered on College Hill, a tract of forty-six and a half acr
between the present Fourteenth and Fifteenth Streets extending north
Florida Avenue to somewhat beyond Columbia Road. The Medical School
located downtown. For the better part of the Columbian University
the buildings of the University were situated along H Street between Thirteen
and Fifteenth Streets.

uring the last half century the University's present plant has been developed
hat section of the old First Ward familiarly known as "Foggy Bottom,"
ween Nineteenth and Twenty-fourth Streets, south of Pennsylvania Avenue.
area has many reminders of historic interest to the University. President
rroe, who signed the charter, lived at 2017 Eye Street. The first President
e Board of Trustees, the Reverend Obadiah B. Brown, was for fifty years
astor of a church at Nineteenth and Eye Streets, and Washington selected
rty-third and E Streets as the site of the National University he had hoped
e established.

COLLEGES, SCHOOLS, AND DIVISIONS

ge Washington University includes 12 colleges, schools, and divisions,
llows:

*lumbian College of Arts and Sciences** offers four-year programs in the
nd sciences leading to the degrees of Bachelor of Arts and Bachelor of
ce. The College also provides prelegal and premedical programs, and the
rofessional work required for admission to the School of Public and In-
tional Affairs. Columbian College has academic jurisdiction over the
ampus programs leading to the degrees of Associate in Arts in General
es, Associate in Science in Cartographic Science, Associate in Science in
esy, Bachelor of General Studies, Bachelor of Science in Geodesy, Bach-
of Science in Cartographic Science, and Bachelor of Science in Ocean-
hy. These off-campus programs are administered by the College of Gen-
udies.

Graduate School of Arts and Sciences†‡ offers advanced study and re-
leading to the degrees of Master of Arts, Master of Arts in Special
s, Master of Fine Arts, Master of Forensic Sciences, Master of Music,
r of Science, Master of Science in Forensic Science, Master of Science in
l Studies, Master of Science for Teachers, and Doctor of Philosophy.
egrees of Master of Arts in Special Studies and Master of Science in
l Studies are also available through off-campus programs administered
College of General Studies.

School of Medicine and Health Sciences†† offers work leading to the
s of Associate in Science, Bachelor of Science, and Doctor of Medicine.

National Law Center‡ offers courses leading to the degrees of Juris Doc-
aster of Laws, Master of Comparative Law, Master of Comparative Law
ican Practice), and Doctor of Juridical Science; and special programs in
ning Legal Education.

School of Engineering and Applied Science offers courses leading to the
of Bachelor of Science in the following areas: Civil Engineering, Elec-
ngineering, and Mechanical Engineering. Graduate programs lead to
grees of Master of Science, Master of Engineering Administration,

College of Arts and Sciences cooperates with the School of Medicine and Health Sci-
offering a program leading to the combined degrees of Bachelor of Arts and Doctor of

duate School of Arts and Sciences cooperates with the School of Medicine and Health
offering a program leading to the combined degrees of Master of Science and Doc
ne and a dual program leading to the degrees of Doctor of Medicine and Doctor o.

tional Law Center cooperates with the School of Public and International Affairs, the
School of Arts and Sciences and the School of Government and Business Administration in
program leading to the combined degrees of Juris Doctor and Master of Arts.

Engineer, Applied Scientist, and Doctor of Science. The School has academ
jurisdiction over the off-campus programs leading to the degrees of Master
Science, Master of Engineering Administration, and Doctor of Science. The
off-campus programs are administered by the College of General Studies.

The School of Education and Human Development offers undergraduate pr
grams leading to the degrees of Bachelor of Arts in Education and Bachelor
Science in Human Kinetics and Leisure Studies; graduate studies leading to
degrees of Master of Arts in Education, Master of Arts in Teaching, Educa
Specialist, and Doctor of Education. The degree of Master of Arts in Educati
is also available through off-campus programs administered by the College
General Studies.

*The School of Government and Business Administration** offers undergrad
ate programs leading to the degrees of Bachelor of Business Administration a
Bachelor of Science in Health Care Administration; graduate programs leadi
to the degrees of Master of Arts in Health Care Administration, Master
Business Administration, Master of Public Administration, Master of Urba
and Regional Planning; the Post-master's Graduate Certificate in Health Ca
Administration; the degrees of Doctor of Business Administration and Doct
of Public Administration. The School also has academic jurisdiction over th
off-campus program leading to the degree of Master of Science in Administr
tion. This off-campus program is administered by the College of Gener
Studies.

*The School of Public and International Affairs** offers undergraduate pr
grams leading to the degree of Bachelor of Arts and graduate programs leadi
to the degree of Master of Arts. The School also offers an off-campus pr
gram leading to the degree of Master of Science in International Affairs

The College of General Studies supplements the adult education program
the University through campus and off-campus study; conferences, seminar
and special projects; and continuing education and noncredit programs. Th
College also administers the off-campus programs over which Columbian Co
lege of Arts and Sciences, the Graduate School of Arts and Sciences, th
School of Engineering and Applied Science, the School of Education, and th
School of Government and Business Administration have academic jurisdictio

The Division of University Students makes available courses for students
candidates for degrees in this University.

The Division of Experimental Programs.

The Summer Sessions.

ACADEMIC STATUS

George Washington University is accredited by its regional accrediting agency
the Middle States Association of Colleges and Secondary Schools.

The University is on the approved list of the American Association of Univ
versity Women and is a member of the College Entrance Examination Boa

The National Law Center is a charter member of the Association of Amer
can Law Schools and is approved by the Section of Legal Education and Ad
missions to the Bar of the American Bar Association.

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* The National Law Center cooperates with the School of Public and International Affairs
Graduate School of Arts and Sciences and the School of Government and Business Administration
offering a program leading to the combined degrees of Juris Doctor and Master of Arts

School of Medicine and Health Sciences is a member of the Associa-
American Medical Colleges and is one of the medical colleges which
en continuously approved by the American Medical Association.
ergraduate curricula of the School of Engineering and Applied Science in
ectrical, and mechanical engineering are accredited by the Engineers'
for Professional Development. The School of Education and Human
pment is a charter member of the American Association of Colleges for
Education and is accredited by the National Council for Accreditation
cher Education for its bachelor's and master's degree programs. The
of Government and Business Administration has maintained full mem-
in the Middle Atlantic Association of Colleges of Business Administra-
ce 1961. It joined the Council on Graduate Education for Public Ad-
ation in 1966. In 1968, the School became a member of the American
ly of Collegiate Schools of Business, and, in 1977, its undergraduate
ns were accredited by the Assembly. The programs in accounting satisfy
cational requirements for the Certified Public Accountant and the Cer-
anagement Accountant professional examinations. The program in hos-
ministration is accredited by the National Accrediting Commission on
e Education for Hospital Administration. The Master of Urban and
Planning degree program is recognized by the American Institute of
. The Department of Chemistry is on the approved list of the American
l Society. The graduate program in clinical psychology in the Depart-
Psychology is on the approved list of the American Psychological As-
. The program in speech pathology and audiology is accredited by
cation and Training Board of the American Boards of Examiners in
athology and Audiology.

RSITY POLICY ON EQUAL OPPORTUNITY

Washington University does not discriminate against any person on the
ex, race, color, religion, national origin, or handicap in any of its edu-
ograms or activities. Federal regulations implementing Title IX of the
n Amendments of 1972 and Section 504 of the Rehabilitation Act of
for an explicit statement that the requirement not to discriminate on
of sex or handicap extends to employment in and admission to such
and activities.
es concerning the application of this policy and federal laws and reg-
oncerning discrimination in education or employment programs and
may be addressed to Marianne Phelps, Assistant Provost for Affirma-
n, Rice Hall, Washington, D.C. 20052, or to the Director of the Office
Rights of the Department of Health, Education and Welfare.

ES FOR HANDICAPPED STUDENTS

o insure that disabled students may have access to George Washington
's many off-campus classes, all facilities that are accessible by wheel-
been identified. Should a student find that registration has been com-
one of the few facilities that cannot accommodate a wheelchair at that
Director of Counseling and Student Services should be contacted at
and arrangements will be made to register the student for a class at
with adequate facilities.

For students with other types of disabilities, the University will insure th any auxiliary aids necessary for students to profit from their educational exper ence are available. Students who are having difficulty in securing necessa auxiliary aids, should contact the Director of Counseling and Student Servic at 676-7000.

Occasionally teaching methods and curriculums may have to be modified t meet a particular set of circumstances. The faculty have been advised of th requirement and are prepared to meet needs as they are indentified. Modifica tion of standards, however, is inappropriate and will not be attempted.

Any disabled student desiring to register for an off-campus course of the George Washington University and needing additional information, should cal the Director of Counseling and Student Services at (202) 676-7000.

LOCATION

The University is in downtown Washington, between Pennsylvania Avenue and 19th, F, and 24th Streets, N.W. In immediately adjacent areas are the White House, the World Bank, the Corcoran Gallery of Art, the Department of State, the National Academy of Sciences, the John F. Kennedy Center for the Performing Arts, and many other governmental and cultural institutions.



GENERAL ALUMNI ASSOCIATION

bjectives of this Association are to unite the graduates who wish to asso- themselves for charitable, educational, literary, and scientific purposes, promote the general welfare of the University.

gible members are those who have matriculated in any school of the Uni- and who have left the University in good standing, or any person who has been a member of the teaching, research, or administrative staff e University, or of the Board of Trustees of the University. Active mem- e those who are life members of the George Washington University Gen- lumni Association or the Alumni Association of any school of the Uni- or are current contributors to the George Washington University Fund. e Alumni Office is located in Alumni House, 714 21st Street, N.W., Wash- D.C. 20052.

alumni are urged to keep the Alumni Office informed of changes of ad- occupation and to supply information with regard to their fellow alumni.

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ODUCTION

College of General Studies, the off-campus division of George Wash- University, was established in 1950 to extend the educational resources University to the community. The College continues in expanding the sity's activities by providing academic programs for adult students and ping to meet the continuing educational requirements of the National area.

College offers off-campus credit courses for the nondegree student, for personal enrichment or for updating or upgrading professional ials. Off-campus degree programs, administered by the College of Gen- dies for other colleges and schools of the University, are offered at the aduate and graduate levels for students who wish to pursue a more program of study. Experimental pilot programs of study are developed eration with other colleges and schools of the University in response to needs of the government and business community. The College also and conducts noncredit courses, seminars, and workshops drawing on urces of the University

taff of instruction for the off-campus programs includes members of time faculty of the University and academically qualified part-time lec- om the Washington professional community.

College works closely with education directors, public school officials, onnel administrators in government, business, and industry to develop f study and expand the educational opportunities for the mature stu- cooperation with these sponsoring groups the College offers courses at us centers throughout the District of Columbia and in nearby Maryland hern Virginia. A center is also located at Hampton, Virginia, serving ater area. Government agencies and installations, business organiza- professional groups interested in having the College organize and con- urse or a comprehensive educational program should contact the As- an of the College of General Studies.

demic standards of the University are maintained in off-campus credit he College of General Studies is accredited by its regional accrediting

agency, the Middle States Association of Colleges an Secondary Schools. programs offered through the University's off-campus program administered the College of General Studies, are approved through the regular Unive procedure authorized by the Board of Trustees and the Charter granted the Congress of the United States. Degrees are granted through the facilitie the degree granting schools and colleges of the University. Credit earned thro off-campus study conforms to the academic standards throughout the Univer

DEGREE PROGRAMS

Columbian College of Arts and Sciences offers the following degrees off c pus:

Associate in Arts in General Studies
Associate in Science in Cartographic Science
Associate in Science in Geodesy
Bachelor of General Studies
Bachelor of Science in Geodesy
Bachelor of Science in Cartographic Science
Bachelor of Science in Oceanography

The Graduate School of Arts and Sciences offers the following degrees campus:

Master of Arts in Special Studies
Master of Science in Special Studies

The School of Engineering and Applied Science offers the following degre off campus:

Master of Engineering Administration
Master of Science
Doctor of Science

The School of Education and Human Development offers the following degre off campus:

Master of Arts in Education
Education Specialist

The School of Government and Business Administration offers the followin degree off campus:

Master of Science in Administration

SPECIAL PROGRAMS

SPECIAL CREDIT PROGRAMS

Special credit courses and programs designed to meet the needs of interested individuals, groups, and agencies are offered in the liberal arts, education, and other areas. From time to time such offerings include foreign-tour programs and other programs of a continuing education nature. For further information contact one of the persons listed below.

SPECIAL NONDEGREE PROGRAMS

Noncredit courses, conferences, seminars, and institutes are offered to meet the needs of individuals and groups. They are designed for business, industry

professional groups. Noncredit courses include such topics as: Agricultural ann, Communication for Managers, Digital Telecommunications, Develop- al Mathematics, English as a Foreign Language, Elements of PERT-CPM niques, Financial Statement Analysis, Financial Evaluation of Projects and stment Opportunities, Forensic Crime Scene Technician Program, Interna- l Transactions—Commercial and Legal Aspects, Intensive Beginning Rus- Introduction to Electronic Data Processing, Management by Objectives, agement Applications of Behavioral Science, Politics of Management, Radio atrum Management, Starting Your Own Business, and Zero Base Budgeting.

or information on Continuing Education for Women Programs, see page 41.

or information on programs in specific geographic areas, contact I. Ralph belles, Manager of District of Columbia Programs, telephone 676-7061; gias Carter, Manager of Maryland Programs, telephone 676-7022; Russell d, Jr., Manager of Virginia Programs, telephone 676-7040.

mission

NDEGREE STUDENTS

campus credit courses may be taken by nondegree students who meet prerequisites prescribed by the department concerned. A student who has dismissed or required to withdraw from this or another institution is not ble to register for at least one fall or one spring semester from the date of action. Formal University admission is not required for registration.

ondegree students wishing to enroll in graduate courses other than those ed by the School of Government and Business Administration must have leted a bachelor's degree or have completed 90 semester hours of under- ate work and the permission of the instructor. Nondegree students who not completed a bachelor's degree may not enroll in graduate courses ed by the School of Government and Business Administration.

redits earned as a nondegree student may later be transferred to degree rams at George Washington University and many other colleges and uni- ties, providing that they are applicable to the desired curriculum, that the ent meets the requirements of the degree program for which application is made, and that all other requirements of the appropriate school are met. School of Government and Business Administration limits such credit to a mum of 15 semester hours. (See page 22 for admission requirements for rams in the School of Engineering and Applied Science.)

MISSION AS A DEGREE CANDIDATE

nts wishing to be admitted as candidates for one of the off-campus under- ate or graduate degree programs of George Washington University may application forms from the College of General Studies, one of the Uni- 's off-campus representatives, or the education officer of their agencies tallations. For information on the procedure to be followed when apply- r admission to campus degree programs, refer to the appropriate George ington University bulletin.

An application for admission, required credentials, and a nonrefundable application fee* of $10 (for undergraduate study) or $25 (for graduate study) should be sent to the appropriate office.

Records presented become the property of the University and *cannot* be returned.

Undergraduate Degree Candidacy—Columbian College of Arts and Sciences

Completed application, required credentials, and the application fee should be sent to the Office of Admissions, George Washington University, Washington, D.C. 20052.

Secondary school graduates applying for Associate's or Bachelor's degree candidacy must present the combined evidence of (1) an acceptable certificate of graduation from an accredited secondary school, showing a minimum of fifteen "units"† in a college preparatory or academic curriculum; (2) College Entrance Examination Board scores for both the Scholastic Aptitude Test and the English Composition Achievement Test. The College Entrance Examination Board tests are preferred; however, the American College Testing battery scores will be accepted, (for students out of high school several years, other appropriate tests may be prescribed). The applicant should request that these scores be sent directly to the Office of Admissions by the Educational Testing Service, Princeton, N.J., or Berkeley, Calif.; or the American College Testing Program, Iowa City, Iowa.

Mature students who do not meet the above requirements may be considered for degree candidacy after the satisfactory completion of at least 15 semester hours of course work with a grade-point average of 2.00 or better. This must include courses in English Composition (Engl 9 or 10 and 11) and 9 semester hours of course work in at least two of the following appropriate areas: Humanities (literature, philosophy, foreign languages), Social Studies (anthropology, economics, geography, history, political science, psychology, sociology), natural and mathematical sciences.

The selection of qualifying courses should be made in conference with the faculty advisor, and a conference concerning plans for study is required of each applicant for admission to candidacy.

ADVANCED STANDING AND ADVANCED PLACEMENT

TRANSFER STUDENTS FROM OTHER COLLEGES AND UNIVERSITIES

Properly certified courses taken at accredited colleges or universities may be applied toward a degree, subject to the curriculum requirements of the degree program and the rules of the Columbian College of Arts and Sciences.

Although a course completed with a grade of *D* is not acceptable for transfer credit, the course may be used to satisfy a curriculum requirement. Credits completed with a *D* grade may not, however, be counted toward the total number of

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* The application fee must be by check or postal money order, payable to George Washington University.

The application fee is waived for graduates of this University applying to the Graduate School of Arts and Sciences, and for students applying for readmission who were registered as degree candidates at the time of their last registration at this University and who have not since registered at another institution.

† A unit represents a year's study in a secondary school subject, including in the aggregate not less than 120 sixty-minute periods, or the equivalent, of prepared classroom work.

ter hours required for the degree. Any course completed with a grade of better may not be repeated for the purpose of earning degree credit.

nsfer students whose previous academic records raise doubts of their abil- complete degree requirements successfully must complete 15 hours of work in this College with a quality-point index of 2.00 or higher, to be lered for degree candidacy. Courses taken to qualify for candidacy must tributed over two or more of the following areas: Humanities (literature, ophy, foreign language), Social Studies (anthropology, economics, geog- history, political science, sociology), and Natural and Mathematical ces. (Students who have not successfully completed an acceptable college in English Composition must include Engl 9 or 10 and 11.) Applicants ave been suspended for academic reasons from this University or another tion must fulfill this same 15-hour requirement and also obtain written val of a petition for admission to degree candidacy from the Committee on ssion and Advanced Standing of Columbian College of Arts and Sciences. University reserves the right to refuse credit for transfer in whole or in or to allow it provisionally. Credit so given may be withdrawn for sub- nt poor work.

the responsibility of the student to have an official transcript sent directly each institution formerly attended to the Office of Admissions, George ington University, Washington, D.C. 20052.

NG CREDIT OR WAIVING REQUIREMENTS BY EXAMINATION

dition to credit allowed in transfer from other accredited colleges or uni- es, a maximum of 30 semester hours of advanced standing may be ob- by any one or any combination of the following methods.

tudent may earn up to a maximum of 30 hours, or waive curricular re- ments without limitation *(passing a waiver examination does not entitle the t to any semester hours of credit)*, by performing satisfactorily on any or the following:

anced Placement Tests (APT).—Administered by the College Entrance ination Board.

hievement Tests (may be used to waive requirements only).—Adminis- by the College Entrance Examination Board.

llege-Level Examination Program (CLEP).—CLEP offers two types of nations: General and Subject Examinations. CLEP General Examina- are offered in five areas: mathematics, social sciences, humanities, natural ces, and English composition. CLEP Subject Examinations measure vement of specific college-level courses and are offered in more than 30 cts.

on admission to degree candidacy, credit is assigned for the General Ex- tions, with the exception of the English composition and mathematics nations, passed at the 50th percentile or above (college sophomore norms). t is assigned, with a few exceptions, for the Subject Examinations passed level recommended in the College Board model policy. A candidate for ree must seek departmental approval *prior to* taking the examination to e credit for a CLEP Subject Examination. Credit may not be earned by g the examination after having taken the equivalent course. Arrangements

for the examinations are the responsibility of the applicant and should be made with the College Entrance Examination Board, Box 1824, Princeton, NJ 08540.*

Special Departmental Examinations in Columbian College of Arts and Sciences.—A student may request any department of Columbian College to offer a special examination covering the subject matter of any specific course. If a CLEP Subject Examination is available, the department may choose to employ it. Approval is not automatically granted; the student must offer evidence of sufficient background to have a reasonable command of the subject matter. (A student who has previously taken examinations to waive course requirements may not subsequently take examinations for credit in the same courses.) Assigning credit (or waiving a requirement) by special departmental examinations will depend on the department's evaluation of the examination paper. These examinations will normally be of at least three hours' duration. A $25 fee for each course examination is charged for preparation, administration, and grading of the examination.

Service Schools.—A maximum of 30 (or a maximum of 12 hours if the courses are "professional") semester hours may be obtained on the basis of service schools satisfactorily completed, as evaluated in accordance with the *Guide to the Evaluation of Educational Experience in the Armed Forces.* Ordinarily such subjects are counted as electives. No credit will be allowed for military experience as such.

Correspondence Courses.—A maximum of 15 semester hours may be earned through the successful completion of correspondence courses of college level which are offered by the U.S. Armed Forces Institute or a regionally accredited college or university.

Examination for Waiving Curriculum Requirements.—A student wishing to omit a required course may, with the permission of the faculty advisor, take a waiver examination, the passing of which satisfies the curriculum requirement and qualifies the student for registration in an advanced course. The fee for each 3-hour course examination is $5. *Passing a waiver examination does not entitle a student to any semester hours of credit.*

Credit Earned Through United States Armed Forces Institute (USAFI) or Defense Activity for Non-Traditional Education Support (DANTES).—Credit is assigned for approved USAFI or DANTES college-level examinations passed with satisfactory scores.

Graduate Degree Candidacy

MASTER'S DEGREES

The Degree of Master of Arts in Education (School of Education and Human Development).—Application for Master's degree candidacy should be filed by June 1 for the fall semester, November 1 for the spring semester, or April 1 for the summer session. The completed application, required credentials, and the

* CLEP examinations in Introductory Accounting, Introduction to Business, Commercial Law, and Data Processing are limited to 3 credits each of advanced standing in the School of Government and Business Administration. All other CLEP examinations in Accounting and Business Administration (School of Government and Business Administration courses) are not accepted for advanced standing.

sation fee should be sent to the Office of the Dean, School of Education Human Development, George Washington University, Washington, D.C. 2.

mission to study toward a Master's degree requires a bachelor's degree an accredited institution, an undergraduate quality-point index of at least (a $C+$ average), demonstrated interest in education or education-related and appropriate undergraduate course work. Students whose quality- index is in the range of 2.30 to 2.49 will be considered for provisional sion. The quality-point index is computed on the basis of the last two of the bachelors' degree program and on all course work completed be- the baccalaureate. Two years of successful teaching are required before sion to candidacy in the field of school administration. Appropriate ex- ce is required for admission to programs in adult education and human ce development.

Degree of Master of Science in Administration (School of Government usiness Administration).—Forms for application for admission or read- n are available at the Office of the Admissions Officer, School of Govern- and Business Administration, George Washington University, Washington, 0052. When completed, application forms and all supporting credentials be submitted to this Office no later than May 1 for the fall semester, nber 1 for the spring semester, and April 1 for the summer sessions. ants who received their undergraduate degrees from foreign universities ubmit applications one month earlier in each case.

be considered for admission applicants must present the following min- credentials: a bachelor's degree from a regionally accredited college or sity that includes at least 90 semester hours of academic work with an undergraduate quality-point index of 2.50 (on a 4.00 scale) and a of at least the 50th percentile on the applicable admission test.

licants must submit scores on the Graduate Management Admission GMAT).* It is the responsibility of the applicant to make arrangements test with the Educational Testing Service, Box 966, Princeton, N.J.

licants whose undergraduate quality-point index is less than 2.50 or Graduate Management Admissions Test score ranks beneath the 50th tile will be considered if (1) the cumulative quality-point index multi- y 200 and added to the GMAT score equals 950 points or (2) the -point index for the last two years of undergraduate work multiplied by d added to the GMAT score equals 1,000 points.

ver of the admission test may be requested by letter by applicants who he following criteria: (1) the undergraduate quality-point index ex- 3.00, (2) the undergraduate degree was conferred no more than five reviously, and (3) the undergraduate major was a discipline which s the graduate program for which the application is made. The Ad- Office will inform the applicant whether or not a waiver will be l.

aximum of one-quarter of the semester hours of graduate course work exceed nine semester hours) required for the degree may be approved nsfer to the School of Government and Business Administration from

nts for the concentration in Public Administration may substitute scores on the Graduate xamination or the Miller Analogies Test.

the Division of University Students, the College of General Studies, another degree-granting division of this University or another accredited college or university under the following conditions: the course work must be approved as part of the student's program of studies, it must not have been applied to the completion of requirements for another degree, it must be graduate-level course work, it must have been taken within the past two years and the student must have received a grade of *B* or better. This action must be approved by a petition to the advisor and the dean. A transcript of the course work must be on file before the petition can be considered. The transfer of credit rule applies to course work taken at this University in nondegree status. The letter of admission will designate the number of credits that have been approved for transfer towards the degree.

The Degrees of Master of Arts in Special Studies or *Master of Science in Special Studies (Graduate School of Arts and Sciences).*—These are interdisciplinary Master's degree programs in specific academic areas offered at off-campus locations by the Graduate School of Arts and Sciences. Application for Master's degree candidacy must be made by members of the group before registration. Completed application, required credentials, and the application fee should be sent to the Office of the Dean, Graduate School of Arts and Sciences, 2000 H Street, N.W., Washington, D.C. 20052.

Admission to graduate study toward a Master's degree in this School requires a bachelor's degree, from an accredited college or university, with an over-all quality-point index of 3.00 (a *B* average) or an equivalent grade.

A maximum of nine semester hours of graduate course work may be approved for transfer to the Graduate School from the Division of University Students, another degree-granting division of this University, or another accredited college or university. See page 96 of the Bulletin of Undergraduate and Graduate Programs for further restrictions on transfer of credit.

The Degrees of Master of Science or *Master of Engineering Administration (School of Engineering and Applied Science).*—Application for Master's degree candidacy *must* be made before registration. Completed application, required credentials, and the application fee should be sent to the Manager of Engineering Admissions, School of Engineering and Applied Science, 725 23rd Street, N.W., Washington, D.C. 20052.

Admission to graduate study toward a Master's degree requires an appropriate bachelor's degree from a recognized institution and evidence of capacity for productive work in the field selected, as indicated by undergraduate grades, Graduate Record Examination scores, and similar data.

An applicant who has significant deficiencies in preparation may be required to take prescribed undergraduate courses as an unclassified student before being admitted to graduate student status. In some cases, if such deficiencies are minimal, he may be admitted to graduate student status and allowed to take a limited number of graduate courses while completing the undergraduate courses in which he is deficient. In no case may the undergraduate courses thus taken fulfill any part of the requirements for the Master's degree.

Students wishing to apply for admission to the program of study leading to the degree of Master of Engineering Administration must meet the following additional admission requirements: (1) the applicant must have an adequate knowledge of the principles of human relations, the fundamentals of engineering economic analysis, and the fundamentals of quantitative methods.

requirement can be met by satisfactory completion of the following under-
uate courses or approved equivalents: EAd 150, *Introduction to Engineer-*
dministration; EAd 160, *Introduction to Engineering Economic Analysis;*
EAd 170, *Basic Quantitative Methods for Engineering Administration.* (2)
applicant may be required to complete other undergraduate prerequisite
es prescribed as a condition of admission. (3) A student is required to earn
rade of *C* or better in these courses (unless the requirement is stipulated to
grade of *B* or better upon admission) in each undergraduate prerequi-
ourse. If this scholarship requirement is not met, the student is barred
further enrollment. A student is not permitted to repeat any of the under-
uate prerequisite courses. Credit for prerequisite courses is not applicable
rd the degree of Master of Engineering Administration.
to six semester hours of satisfactory credit (with grades of *A* or *B*), which
ally must have been earned in a graduate program at another recognized
ution, *may* be accepted in transfer, when applicable, to satisfy Master's
e requirements in the School of Engineering and Applied Science. How-
the student must, with the approval of the advisor, petition to the appro-
e department chairman for such a transfer.

ATION SPECIALIST DEGREE

Degree of Education Specialist (School of Education and Human De-
ment).—Each applicant must be interviewed and recommended by a staff
er of the School of Education and Human Development or by a represen-
in the candidate's locality appointed by the Dean. Admission requires a
r of Arts in Education degree from this University (or the equivalent), a
actory score on the Miller Analogies Test or the Graduate Record Examina-
or grades in graduate course work which meet standards set by the Ad-
d Graduate Faculty and two years of successful pertinent experience.
leted application, required credentials, and the application fee should be
the Office of the Dean, School of Education and Human Development,
e Washington University, Washington, D.C. 20052.

OR OF SCIENCE DEGREE

Degree of Doctor of Science (School of Engineering and Applied
e).—The prospective doctoral student seeking admission should apply
June 1 for the fall semester and before December 1 for the spring se-
. Personal interviews may then be arranged to discuss the applicant's
ications and the possibilities for an effective doctoral program. The appli-
nust arrange for complete documentary records (transcripts) to be for-
d to the Manager of Engineering Admissions, School of Engineering and
d Science, 725 23rd Street, N.W., Washington, D.C. 20052, in sufficient
o permit assembly of complete records for evaluation as soon after the
application deadlines as possible.
be admitted to the doctoral program, a satisfactory master's degree from
redited institution is required, together with acceptable personal qualities
capacity for creative scholarship. Normally, a *B* average in graduate
is required. However, the minimum does not assure automatic accept-

ance; the departments may, and often do, set higher admission standards. The applicant must arrange for letters of recommendation to be submitted from two faculty members of the institution from which the master's degree was received; one of these, if possible, should be from the master's advisor. The letter should be addressed to the appropriate department chairman.

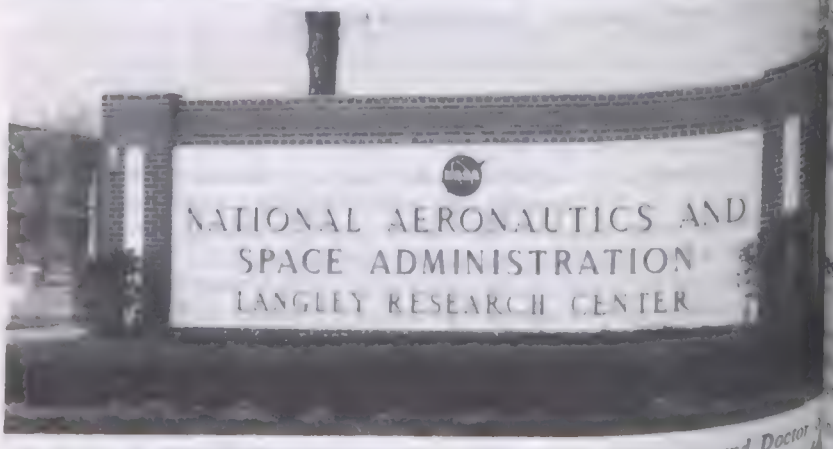
Up to six semester hours of credit earned in courses completed with the grade of *A* or *B* while enrolled in a doctoral program at another accredited institution may be accepted in transfer to satisfy doctoral requirements at this School, subject to the approval of the student's adviser and his department chairman. Credit earned in courses completed more than five years prior to admission to the doctoral program will not be accepted in transfer, and some departments may require that transfer credit must have been earned within a shorter period of time before admission.

READMISSION

A student who withdraws, is suspended, or is otherwise absent from the University for one or more spring or fall semester, must make formal application for readmission. If readmitted, the student is subject to the rules and regulations in force at the time of return. Complete and official transcripts from each institution the student has attended since making the previous application must be sent to the appropriate office at this University before the application for readmission can be evaluated.

When there are curriculum changes in graduate programs in the School of Government and Business Administration, the readmitted student may be required to take additional course work.

The application fee is waived for students applying for readmission who were registered as degree candidates at the time last registered at this University and who have not since registered at another institution.



NASA Langley Research Center, Hampton, Va.—Master of Science and Doctor of Science degree programs are offered at this location through the Joint Institute for Advancement of Flight Sciences (SEAS–NASA).

gistration

CAMPUS REGISTRATION is conducted before or at the first class meet- of each course, at times and places stated in the *Off-campus Schedule of ses*, available well in advance of each semester.

egistration in an off-campus course *constitutes admission to that course* It does not admit the student to campus courses or to degree candidacy. students admitted to degree candidacy may enroll as full-time students 9 semester hours or more). Students taking course work to qualify for de- candidacy who are registered in this College may not take more than 10 s in a semester. Those who have graduated from high school recently and to be *full-time freshmen* at this University should apply for admission to ppropriate college or school on campus.

f-campus degree candidates in an area of concentration with a small enroll- which would not justify offering certain required courses off campus may to register for campus courses in order to meet the requirements for the e. *See page 31, Campus Study, for details concerning permission to regis- r campus courses.*

diting.—With the permission of the instructor, students may register as ors. An auditor is not required to take active part or to take examina- the auditor receives neither grades nor credit. Tuition is the same for the r as for the student registered for credit. With the approval of the dean, a t may change from credit to audit status during the first third of the er. A student who takes a course as an auditor may not repeat it later edit.

current Registration.—A student registered as a degree candidate in any college or school of the University may take credit courses in the College neral Studies *only by permission (granted prior to registration) of the* f the college or school concerned. A College of General Studies Off- s Concurrent Registration Permit form must be obtained from the riate college or school, signed by the dean of that college or school, and ed at the time of registration in the College of General Studies.

student taking course work in another college or school of the Univer- at another institution through the Consortium of Universities of the gton Metropolitan Area, Inc., must have the dean's permission.

and Financial Regulations

es should be paid by check or money order, made payable to George gton University. The student identification number should appear in the ft-hand corner.

following fees were adopted for the 1978 summer sessions and academic 978–79. (See page 28 for projected tuition and fee increases for 2.)

Tuition*

On campus:

Part-time undergraduate program, other than in the School of Engineering and Applied Science, for each semester hour .....

Part-time undergraduate program in the School of Engineering and Applied Science, for each semester hour .....

Graduate study other than in the School of Engineering and Applied Science, for each semester hour .....

Graduate study in the School of Engineering and Applied Science, for each semester hour .....

Off campus:

For each semester hour† .....

School of Engineering and Applied Science off-campus programs, for each semester hour‡ .....

Thesis:§

Master of Arts in Education and Master of Science in Administration degree programs (other than ICAF), for each semester hour .....

School of Engineering and Applied Science programs, for each semester hour‡ .....

University Center Fee (charged only to students registered on campus, nonrefundable)

For students registered for 11 or more semester hours on campus:

For each semester .....

For students registered for less than 11 semester hours in a semester on campus:

For each semester hour for which the student registers .....

For on-campus degree candidates maintaining "continuous registration" status:

For each semester .....

Charles E. Smith Center Fee (for off-campus degree candidates only)
Students registered as degree candidates in a program offered through the College of General Studies may purchase, on a semester-by-semester basis, a special card entitling them to use the Smith Center facilities for that semester or session. Students must first obtain from CGS a signed certificate attesting to degree candidacy .....

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* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate, School of Engineering and Applied Science, or Medicine and Health Sciences Programs*).

† Except School of Engineering and Applied Science programs.

‡ This fee does not apply to special off-campus programs arranged with the School of Engineering and Applied Science.

§ Payment of tuition for a Master's thesis entitles the candidate, during the period of registration, to the advice and direction of the member of the faculty under whom the thesis is to be written. In case a thesis is unfinished, additional time may be granted in accordance with the regulations of the school in which the student is registered. (See page 35 for regulations governing military leave.)

ial Fees

ication fee* (undergraduate degree candidate), nonrefundable	$10.00
ication fee (graduate degree candidate), nonrefundable	25.00
ation fee, due and payable at the time of registration for the last mester or summer session:	
ociate's degree	10.00
elor's, Master's, and Doctor of Science degrees	25.00
al Columbian College of Arts and Sciences departmental examination fee, for each course to qualify for receiving credit (advanced nding), waiver of requirement, or both	$25.00
inuous Registration fee, *off-campus degree candidates (other than se in the School of Engineering and Applied Science),* to maintain ontinuous registration" during any semester of absence from the iversity† (nonrefundable)	82.00
inuous Registration fee, *on-campus or off-campus,‡ degree candidates the School of Engineering and Applied Science,* to maintain "con-uous registration" during any semester of absence from the Univer-y or after completion of tuition requriements† (nonrefundable)	110.00
egistration fee, for failure to register for campus courses within the gnated period	15.00
or binding two copies of the Master's thesis	15.00
or Microfilm Service and Printing Announcement of Final Exami-ion (Doctor of Science candidates)	65.00
ayment fee, for failure to make payments when due (see "Payment Fees," pages 29–30)	15.00
npus financial reinstatement fee, for reinstatement after financial mbrance for nonpayment of fees (see "Payment of Fees," pages 0)	35.00
npus financial reinstatement fee, for reinstatement after financial mbrance for nonpayment of fees (see "Payment of Fees," pages 0)	15.00
d check fee, charged a student whose check is improperly drafted, nplete, returned by the bank for insufficient funds, or returned for other reason	15.00
each examination to waive a curriculum requirement	5.00
ipt fee, for each transcript of record	2.00
or more transcripts are requested at the same time, fee for each first two copies is $2.00 each, fee for each additional copy	.50
ment of lost or stolen picture identification card	2.00

will be increased to $15 beginning with applications for admission to the Summer Sessions

of the continuous registration fee entitles the student who is granted leave of absence and continue his work toward a degree under the academic requirements which were in e time of his first registration. The continuous registration fee applies toward neither nor residence requirements for the degree. This fee does not apply to students granted ve (see page 35).

does not apply to special off-campus programs arranged with the School of Engineering l Science.

PROJECTED TUITION AND FEE INCREASES 1979–82

Projected increases for the academic years 1979–80, 1980–81, and 1981–82 have been estimated as follows:

On Campus*

† Increase by semester hour (graduate and part-time undergraduate students):

1979–80 .....
1980–81 .....
1981–82 .....

Off Campus

† Increase by semester hour (except School of Engineering and Applied Science programs):

Course Work Other Than Thesis:

1979–80 .....
1980–81 .....
1981–82 .....

Thesis for Master of Arts in Education and *Master of Science in Administration programs:*

1979–80 .....
1980–81 .....
1981–82 .....

†‡ Increase by semester hour (School of Engineering and Applied Science programs including thesis):

1979–80 .....
1980–81 .....
1981–82 .....

The University Center fee will be increased for the 1979 summer sessions and the academic year 1979–80. For students taking 11 or more semester hours, the fee will be $55.50 per semester. Students taking less than 11 semester hours will pay $5.25 per semester hour.

It is not possible to project future economic data with certainty. The increases outlined above are merely estimates based on present circumstances and should in no way be interpreted as fixed limits on tuition increases. The University hopes to keep tuition increases as low as possible, but it is obligated to maintain a sound financial basis. Economic conditions in the recent past, particularly as they affect private educational institutions, have been extremely variable, and significant increases in tuition in excess of the above limits may be required.

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* Students interested in full-time undergraduate study on campus should consult the appropriate catalogue (*Undergraduate and Graduate, School of Engineering and Applied Science*, or *Medicine and Health Sciences Programs*).

† Semester-hour increases become effective at the beginning of the summer sessions preceding the academic year.

‡ This increase by semester hour does not include the projected increases for special off-campus programs arranged with the School of Engineering and Applied Science.

YMENT OF FEES

I-CAMPUS COURSES

s for each semester are due and payable in full at the time of each regis-ion; however, a student registering for a *13-week or longer credit course* sign a deferred payment contract at each registration to make payments hree equal installments—one-third at the time of registration, one-third by ber 4, 1978, and one-third by November 6, 1978 (for the fall semester); hird by February 9, 1979, and one-third by March 8, 1979 (for the g semester). Payments are due at the stipulated times. Interest at the of 8 per cent per annum on the unpaid balance will be charged from the ning of each semester to the date payment is made.

udents receiving partial government tuition assistance must pay their por-of the tuition in full at the time of registration.

cept for specified special sessions, tuition and fees for credit courses last-ks than 13 weeks, and for all noncredit courses, are payable in full at ration.

udents who fail to make any payment when due will be automatically ed a $15 late-payment fee and will be subject to an interest charge of cent per annum. Accounts which become 30 days past due will be finan-encumbered. In the event a student's account is financially encumbered, udent forfeits his rights to the use of deferred payment contracts in fu-emesters, and the Student Accounts Office will notify the Registrar to old grades, future registration privileges, transcripts, diplomas, and other nic information until the account is settled financially. Financial settle-will require payment in full of all amounts due the University in addi-a financial reinstatement fee of $15.

dents auditing courses are subject to all fees charged to students regis-or credit.

S COURSES

dent is permitted to complete registration or attend classes until all are paid. Tuition and fees for each semester are due and payable in the Office of the Cashier at the time of each registration. Checks and money orders should be made out to George Washington University. ncial credit is made by student number. It is therefore essential that dent identification number appear in the upper left-hand corner of the

Student Accounts Office has responsibility for billing and maintaining accounts for tuition, various fees, and room and board charges. A stu-istered for six semester hours or more may sign a deferred payment with the Student Accounts Office at the time of each registration per-payment of one-half of the total tuition and fees (except for fees pay-dvance) at the time of registration and the remaining half on or be-ober 25, 1978 (for the fall semester) and March 7, 1979 (for the mester). Interest at the rate of 8 per cent per annum on the unpaid will be charged from the date of registration to the date payment is

ts receiving tuition assistance in the form of scholarships, government ontracts, or other forms of tuition awards are not permitted to sign

deferred payment contracts unless the total tuition and fee charges exceed value of the tuition awards by $600 or more. Under such circumstances student may be permitted to pay one-half of the amount due at the time registration and to defer the balance by signing a deferred payment contr

Students who fail to make any payment when due will be automatic charged a $15 late-payment fee and will be subject to the interest charge o per cent per annum. Accounts which become 30 days past due will be fin cially encumbered. In the event a student's account is financially encumbe the student forfeits rights to the use of deferred payment contracts in ture semesters, and the Student Accounts Office will notify the Registrar withhold grades, future registration privileges, transcripts, diplomas, and ot academic information until the account is settled financially. Financial set ment will require payment in full of all amounts due to the University in dition to a financial reinstatement fee of $35.

Students auditing courses are subject to all fees charged to students re tered for credit.

REFUND OF FEES FOR OFF-CAMPUS REGISTRATION*

Applications for withdrawal from a course or for change in class sched must be made in writing. Notification to an instructor is not an acceptab notice (see "Changes in Program of Studies," page 34).

In authorized withdrawals and changes in schedule, cancellations of sem ter tuition charges will be made in accordance with the following schedule f the academic year:

REFUND SCHEDULE 1978–1979

Long Session (or any session longer than 13 weeks)

90%	Starting date of class plus 6 calendar days
75%	Starting date of class plus 20 calendar days
50%	Starting date of class plus 34 calendar days
0%	Starting date of class plus 35 calendar days to end

Intermediate Session (9 weeks, 1 day per week)

90%	Starting date of class plus 6 calendar days
75%	Starting date of class plus 13 calendar days
50%	Starting date of class plus 20 calendar days
0%	Starting date of class plus 21 calendar days to end

Short Session (7 weeks, 2 days per week)

90%	Starting date of class plus 2 calendar days
75%	Starting date of class plus 8 calendar days
50%	Starting date of class plus 15 calendar days
0%	Starting date of class plus 16 calendar days to end

* For regulations concerning refunds of fees for students who register for courses on campus, s the appropriate bulletin (*Undergraduate and Graduate, the School of Engineering and Applie Science* or *Summer Sessions Programs*).

Session (3 weeks)

90%	Starting date of class plus 1 calendar day
75%	Starting date of class plus 5 calendar days
50%	Starting date of class plus 9 calendar days
0%	Starting date of class plus 10 calendar days to end

refund will be awarded for sessions of less than 21 days.

No exceptions will be made for holidays, late registration, absences, or class scheduling for any reason whatsoever.

A student who is granted military leave before completing the semester will ive credit for current charges in accordance with the schedule for with- rawals from the University (see above). Payments made in excess of the non- ndable balance will be refunded to the student. The nonrefundable balance be maintained as a deferred credit for use by the student when he returns e University (see "Military Leave," page 35).

In no case will tuition be reduced or refunded because of absence from sses.

Payment applies only to the semester for which a registration charge is in- ted and will not be credited to another semester (exception: students granted tary leave, see page 35).

Authorization to withdraw and certification for work done will not be given a dent who does not have a clear financial record.

W ENFORCEMENT EDUCATION PROGRAM

program of grants and loans, authorized under the provisions of the Omni- Crime Control and Safe Streets Act of 1968, is intended to help pay the of educational expenses for employees of state and local criminal justice ncies. Studies may be full- or part-time in a wide range of subject areas and ree goals. Applications and further information are available from the LEEP rdinator, Graduate School of Arts and Sciences, telephone 676-6210.

gulations

MPUS STUDY

CAMPUS DEGREE CANDIDATES may register for campus courses approved their programs if these courses are not available at off-campus centers. mbian College degree candidates must notify the Office of Student Rec- College of General Studies, telephone 676-7017, at least two weeks prior e date of campus registration. School of Education and Human Develop- t degree candidates call 676-6160 four weeks in advance of campus regis- on. Other off-campus degree candidates should call the appropriate school weeks in advance as follows: Graduate School of Arts and Sciences students 676-6210; School of Government and Business Administration graduate

students call 676-6584; and School of Engineering and Applied Science studen call 676-6158. Registration materials may be picked up by the students at buil ing K, 817 23rd St., N.W., during registration.

A student may register for on-campus courses as a nondegree student in t Division of University Students, telephone 676-6370.

ATTENDANCE

Students may not attend classes until registration is completed and fees d are paid. Students may attend only those classes for which they are registere Regular attendance is expected. Students may be dropped from any course f undue absence.

SCHOLARSHIP

GRADES

Grades are mailed to the student through the Office of the Registrar at t close of each semester. They are not given out by instructors or the admini trative staff.

UNDERGRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Satisfacto *D*, Low Pass; *F*, Fail; *I*, Incomplete; *W*, Authorized Withdrawal; *CR*, Credit *NC*, No Credit. Except for courses which specifically state that repetition f credit is permitted, a candidate for a degree at this University may not repe for credit a course in which the student has received a grade of *D* or bette unless required to do so by the department concerned. A written statemen to this effect must be submitted to the Registrar by the appropriate depart mental chairman.

GRADUATE

The following grading system is used: *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; *I*, Incomplete; *CR*, Credit; *W*, Authorized Withdrawal. Except for courses which specifically state that repetition for credit is permitted, student taking School of Education and School of Government and Busines Administration courses may not repeat for credit a course in which the studen has received a grade of *C* or above. A student taking a Graduate School of Arts and Sciences course may repeat for credit a course in which the studen has received a grade of C or above only when permitted to do so by the de partment concerned, unless the course description states that the course ma be repeated for credit. A written statement to this effect must be submitted f approval to the dean's office. It is then filed with the Registrar. A studen taking School of Engineering and Applied Science courses may not repeat f credit a course in which a grade of *C* or above has been received, unless re quired to do so by the department concerned; a written statement requiri the student to repeat such a course for credit must be submitted to the Regi trar by the appropriate department chairman.

MPLETE/AUTHORIZED WITHDRAWAL

oever a grade has not been assigned, the symbol *I* (Incomplete), the sym- W (Authorized Withdrawal) or the symbol *F* (Unauthorized Withdrawal) be recorded. The symbol *I* indicates that a satisfactory explanation has given the instructor for the student's inability to complete the required of the course. At the option of the instructor, the grade of *I* may be re- d if a student, for reasons beyond the student's control, is unable to com- the work of the course and if the instructor is informed of, and approves, reasons before the date when grades must be reported. The grade may ed only if the student's prior performance and class attendance in the e have been satisfactory. Any failure to complete the work of a course is not satisfactorily explained to the instructor before the date when s must be turned in will be graded *F*. If acceptable reasons are later pre- to the instructor, the instructor may initiate an appropriate grade change.

VING AN INCOMPLETE

formation concerning the removal of a grade of *Incomplete* from a stu- record, consult the regulations of the college or school (see pages 45, , 69, 73).

UALITY-POINT INDEX*

rship is computed in terms of the quality-point index. This is done by g the total number of quality points by the total number of semester for which the student has registered. Quality points are computed from as follows: for each semester hour of the letter grade—*A*, 4 points; oints; *C*, 2 points; *D*, 1 point; *F*, no points. Example: if a student re- an *A* in one three-credit course, and a *B* in another three-credit course, ld compute his quality-point index this way:

x 3 (semester hours) = 12
x 3 (semester hours) = 9

6 — 21 ÷ 6 = 3.5 quality-point index

ses marked *W, I, CR, or NC* are not considered in determining the in- cept that courses marked *I* will be considered after a formal grade is re- Grades in courses taken at other institutions are not considered in ng the quality-point index.

GS†

intervals during the academic year, students who are doing work of *D* r lower in courses with departmental numbers below 100 receive gs." A "warning" constitutes notice to the student that he or she must the instructor and the advisor at the earliest opportunity. "Warning are established during the seventh and eighth weeks of 13-week and during the third and fourth weeks of six and a half week courses.

cable to Columbian College or to graduate study in the School of Engineering and Ap- e.

cable to the School of Government and Business Administration.

CHANGES IN PROGRAM OF STUDIES

DROPPING A COURSE OFF CAMPUS

A course may be dropped without academic penalty during the first thir the semester (first through third class meeting in the School of Governm and Business Administration; first through fourth class meeting in all o schools). Withdrawing from a course without academic penalty after period requires approval of a written request, *accompanied by a compl change slip*, addressed to the Dean of the College of General Studies.

Procedure for Dropping Courses.—An off-campus change slip (obtain from the instructor or from the College of General Studies) must be comple and signed by the student and the instructor, and submitted to the College General Studies. The instructor will indicate on the change slip whether or the student is passing. Merely reporting a withdrawal to an instructor does effect official withdrawal from a course. The effective date of withdrawal be determined by the appropriate dean. Full refund, if appropriate, will also indicated by the dean.

Failure to follow the proper procedure will result in the Office of the Regi trar recording the grade of *F* and, regardless of the time of discontinuance, not relieve the student of financial responsibility for the entire course.

DROPPING A COURSE ON CAMPUS

A *campus* change slip (available at the Office of the Registrar) must be com pleted and signed, and dated by the instructor and submitted as follows: Colum bian College degree candidates submit theirs to the Office of Counseling and Student Services, College of General Studies. All other degree candidates sub mit their campus change slips to the appropriate dean.

Each college, school, and division of the University sets deadline dates each semester concerning withdrawal. Withdrawal between these dates and the end of the semester is permitted only in exceptional circumstances.

All charges for courses dropped without the approval of the dean must be met by the student. Reporting the dropping of a course to an instructor does not constitute an official withdrawal.

TRANSFER WITHIN THE UNIVERSITY

Transfer from one college, school, or division of the University to another may be made only with the approval of the deans concerned. Applications for transfer are available at the University's Office of Admissions or at the office of the appropriate dean. Upon transfer the student should consult his or her faculty advisor as to the requirements that must be fulfilled.

A maximum of 42 semester hours is transferable toward the Associate of Arts in General Studies degree; a maximum of 90 semester hours is transferable toward a Bachelor's degree; a maximum of nine semester hours is transferable toward a Master of Science in Administration degree; and a maximum of nine semester hours is transferable toward the degree of Master of Arts in Special Studies, Master of Science in Forensic Science, or Master of Science in Special Studies. Students transferring within the University are advised to note the residence requirements of the degree sought.

EDIT

dit toward a degree is given only after registration for and satisfactory com- on of the required course work, or upon the granting of advanced stand- in accordance with the regulations of the College.
r transfer from credit to audit status, see page 25.

ANCE SHEET

request, Office of the Registrar will issue to undergraduate degree candi- a balance sheet showing the amount of work completed and the require- s remaining to be met for the degree. A second balance sheet will be d only in the event the student changes major or degree objectives.

NSCRIPTS OF RECORD

al transcripts of student records are issued on written request of the stu- or former student who has a clear financial record. A fee of $2 is charged ach transcript. When more than two transcripts are ordered at the same a $2 fee is charged for each of the first two transcripts and a $.50 fee ged for each additional transcript.

TINUOUS REGISTRATION

e candidates are expected to maintain continuous registration until *all* de- requirements are satisfied (for "Leave of Absence" exception granted e Graduate School of Arts and Sciences, see page 61). Students who completed course requirements (including the thesis) must maintain con- s registration by paying the "continuous registration" fee (see page 27). ling to register for one semester or more, the student breaks registra- nd must be readmitted (see "Readmission," page 24). A readmitted t is subject to the regulations and requirements in force at the time of ssion.
nts must be registered during the summer if they are taking courses, are required examinations, are receiving guidance toward theses or disser- or are expecting to graduate at the end of the Summer Sessions.

ARY LEAVE

nt called to active duty may be granted military leave for the period of uty, upon presentation to the dean of a copy of the military orders and n for such leave. The maintenance of "continuous registration" is not of the student on military leave; however, the student must apply mission to the University well in advance of the semester of ex- eturn. Payments for tuition and fees which are not refunded to the t the time the military leave is granted will be maintained as a de- edit for the student's account and used upon return to the University.

GRADUATION REQUIREMENTS

Degrees are conferred in February, May, and September.

To be recommended for graduation a student must have met the admiss requirements of the college or school in which registered; completed satisf torily the scholarship, curriculum, residence, and other requirements for degree for which registered; and be free from all indebtedness to the Univ sity. Registration, either for course work or on the "continuous registrati fee basis, is required for the semester or summer session at the close of wh the degree is to be conferred. A letter concerning degree completion is s to military files upon request.

Application for Graduation.—An "Application for Graduation" form *must* filed and the appropriate fee paid at the time of registration for the last semes or summer session of the senior or final year. Students completing degree r quirements during the Summer Sessions will be awarded diplomas (no form convocation) September 30, *provided* they have completed all degree requir ments and have applied for graduation as a part of registration for the Summ Sessions.

Scholarship.—The student must meet the scholarship requirements for t particular degree for which he is registered.

Curriculum.—See the requirements for the degree concerned.

Residence.—A student is "in residence" only when registered for course wo after filing formal application for degree candidacy or for the 15 semester hou undertaken to qualify for degree candidacy (see the specific residence requir ments for the degree concerned).

With the permission of the appropriate dean, a student may be granted leav of absence; such student should, however, remain technically in residence paying the continuous registration fee for each semester he is absent (for ex ception granted by the Graduate School of Arts and Sciences, see page 61). For the purpose of this regulation, the summer session is disregarded.

Except for Master's degree candidates in the Graduate School of Arts and Sciences, the School of Education and Human Development, and the School Engineering and Applied Science, service personnel who receive military train fers when they are within six hours of a degree may, by special arrangement be permitted to complete their work elsewhere, transfer these credits to the ap propriate school or college, and receive a degree from the University. This pro cedure does not apply to Master's candidates who have been granted six hour of transferred credit or have not completed the required courses.

Attendance and Conduct.—The University reserves the right to refuse confer a degree upon a candidate whose attendance or conduct has been unsa isfactory.

Thesis or Dissertation—A thesis or dissertation submitted in partial fulfi ment of requirements for a degree must be presented in its final form to dean of the college or school concerned no later than the date specified in University Calendar.

Accepted theses and dissertations, with accompanying drawings, become property of the University and are deposited in the University Library, where the duplicate copies are bound and made available for circulation. See the ap propriate college or school in this bulletin for regulations governing theses and dissertations.

NORS

n's List.—To be eligible for inclusion on the Dean's List, a student must
candidate for an undergraduate degree. Course work taken while the ap-
tion for admission is being processed will be computed in determining eli-
ity for the Dean's List. In Columbian College of Arts and Sciences degree
grams, a student must have received grades of *A* in at least 60 per cent of the
15 semester hours of work and no grades below *B* for that semester.

ith Distinction.—The undergraduate degrees may be conferred "With Dis-
on," at the discretion of the Dean's Council of the College and the Com-
ee on Scholarship. In Columbian College of Arts and Sciences programs the
ent must have received grades of *A* in at least 60 per cent of the courses
n at this University.
o be eligible a student must have completed at this institution at least
alf of the course work required for the degree.

ecial Honors.—Special Honors may be awarded to any member of the
uating class for outstanding achievement in the student's major field upon
mmendation of the major department. The student must fulfill the fol-
g requirements:
Candidacy for Special Honors must be approved by the faculty member
senting the major department or field not later than the beginning of the
r year.
Such other conditions as may be set at the time candidacy is approved
be met.
At least one-half of the courses required for the degree must have been
eted at GW.
The specific requirement of the college or school in which registered,
e fulfilled. In Columbian College of Arts and Sciences the student must
eceived grades of *A* or *B* in 50 per cent of the courses taken at this in-
n.

A student may receive the Associate in Arts degree "With Distinction"
tudent has taken at this institution at least one-half of the courses re-
for the degree and has received the grade of *A* in at least 60 per cent
courses.

NESTY

iversity community, in order to fulfill its purposes, must establish and
guidelines for academic behavior. Members of the Community are
to exhibit honesty and competence in their academic work.
ing students have a special responsibility to acquaint themselves with,
e use of, all proper procedures for doing research, writing papers, and
aminations.
ers of the community will be presumed to be familiar with the proper
procedures and held responsible for applying them. Deliberate fail-
t in accordance with such procedures will be considered academic dis-
Acts of academic dishonesty are a legal, moral, and intellectual of-
inst the community and will be prosecuted through the proper uni-
annels.

Copies of the University policy on academic dishonesty can be obtained f
the following offices: all department chairmen, all academic deans, and the V
President for Academic Affairs.

STUDENT CONDUCT

All students upon enrolling and while attending The George Washing
University are subject to the provisions of the *Statement of Student Rig
and Responsibilities* which outlines student freedoms and responsibilities
conduct, the Judicial System for Non-Academic Student Discipline, a
other policies and regulations as adopted and promulgated by appropri
University authorities. Copies of these documents may be obtained at t
Office of the Vice President for Student Affairs. Sanctions for violation
these regulations may include permanent expulsion from the University whic
may make enrollment in another college or university difficult. Regulation
or requirements applicable only to a particular program, facility, or class
students may not be published generally, but such regulations or requirement
shall be published in a manner reasonably calculated to inform affected stu
dents.

THE LIBRARY

A student registered in the College of General Studies is entitled to the use o
the University Library. Its stacks are open, and all students are welcome
browse at their leisure. A permit form for library privileges is issued to eac
student. A borrower's card may be obtained by presenting the permit form
the circulation desk of the Library.

The loan period for stack books is 14 days. A fine of 25 cents is charged fo
each day a book is overdue. Any book which circulates is subject to recall
the Library if needed for reserve or other use. Most reserve material must
used in the reserve reading room. Students should check with the desk fo
regulations regarding overnight use. A fine of 50 cents is charged for eac
hour or fraction thereof that reserve material is overdue. Grades of a studen
are withheld until fines are paid.

All students using the University Library are expected to be familiar with
detailed regulations, available at any of the Library's service desks.

RIGHT TO DISMISS STUDENTS

The right is reserved by the University to dismiss or exclude any student f
the University, or from any class or classes, whenever, in the interest of
student or the University, the University Administration deems it advisable.

RIGHT TO CHANGE RULES

The University and its various colleges, schools, and divisions reserve the r
to modify or change requirements, rules, and fees. Such regulations shall
into force whenever the proper authorities may determine.

HT TO MAKE CHANGES IN PROGRAMS

right is reserved by the University to make changes in programs without ce whenever circumstances warrant such changes.

IVERSITY POLICY ON RELEASE OF STUDENT INFORMATION

Family Educational Rights and Privacy Act of 1974 applies to institu- l policies governing access to and release of student education records tained by educational institutions which are recipients of federal funds. University complies with this statute, which states, in part, that such insti- ons must:

afford students access to education records directly related to them;

offer students an opportunity for a hearing to challenge such records as inaccurate, misleading, or otherwise inappropriate;

receive students' written consent before releasing information from their education records to persons outside the University, except for directory information as indicated below. Information may be furnished to a student's parents without such written consent only upon certification of the student's financial dependency; and

comply with a judicial order or lawfully issued subpoena to release a student's record, notifying the student of this action.

University will release the following directory information upon request: local address, and telephone number; name and address of next of kin; of attendance; school, college, or division of enrollment; field of study; hours earned; degrees earned; honors received; participation in organiza- and activities chartered or otherwise established by the University (in- intercollegiate athletics); and height and weight of members of athletic A student who does not wish such directory information released must itten notice to this effect in the Office of the Registrar.

ersity guidelines on the release of student information may be obtained e Office of the Registrar.

t Services

SOCIETIES

gma Lambda.—A national honor society for part-time evening col- off-campus undergraduate degree students, the purpose of which is ize and encourage scholarship and leadership among undergraduate ndidates. Membership is limited to students who have been enrolled semesters or terms in the College of General Studies and have com- semester hours of work toward a degree with a 3.50 average, or t. The Alpha Alpha Chapter was established at George Washington in 1965.

a Kappa.—Undergraduate degree candidates in the College of General ograms are eligible for membership in Phi Beta Kappa, a national

scholarship honorary society. The society recognizes "outstanding intellect capacity well employed" in the field of liberal arts and sciences. Senior a junior students who are candidates for the degree of Bachelor of Arts, Bache of Science, or Bachelor of General Studies in Columbian College, and who ha shown broad cultural interests, distinguished scholarly achievement, high ch acter, general promise, and scholarly ideals may, to a number not exceeding per cent of a class, be elected to membership by the faculty members of t Alpha Chapter of the District of Columbia. Seniors and juniors in oth schools of the University who meet the above requirements are also eligible f consideration for membership, provided that their program of studies includ appreciable work in the liberal arts.

COUNSELING

Students in the off-campus programs may obtain educational counseling an assistance in program planning through the Office of Counseling and Student Services or from University representatives at the various off-campus centers The Office of Counseling and Student Services coordinates student personnel services, including adult academic counseling, vocational guidance as relate to educational programs, and liaison with other University departments and serv ices, as well as serving as a resource center for information on tuition assist ance available to students in the College of General Studies programs. Appoint ments may be made by calling the College of General Studies, telephone 676 7000, or through the Education Director at locations where courses are sched uled. University counselors are also available at all locations during announce registration periods and at scheduled times each month.

UNIVERSITY BOOKSTORE

Textbooks may be ordered by mail from the University Bookstore. Forms fo this purpose are available at registration. The hours of the Bookstore will b announced in the *Schedule of Classes*.

The Bookstore is located in the Cloyd Heck Marvin Center, 800 21st Stree N.W.; telephone 676-6870.

VETERANS BENEFITS

The veterans counselor in the Office of the Registrar, Luther Rice Hall, 21 Eye Street, N.W., assists students entitled to educational benefits as veter widows, or children of deceased or totally disabled veterans with any problem which may arise concerning their benefits. This office also processes certifica tion of enrollment and attendance to the Veterans Administration so that monthly allowances will be paid.

When feasible, students entitled to benefits as veterans or dependents veterans should consult with the veterans counselor prior to submitting an ap plication to the Veterans Administration. New applications for Veterans Ad ministration educational benefits and requests to transfer benefits to GW

ld be processed through the veterans counselor and not directly to the
ans Administration.
e Veterans Administration is at 941 N. Capitol St., N.E., Washington,
20421.

DENT AND ALUMNI CAREER SERVICES OFFICE

Career Services Office provides career guidance and placement to GW
nts and alumni. Some of the specific services are: full-time and part-
job vacancy lists, career counseling, programs on job-seeking skills, a full
y of literature on occupations and employers, and current information
overnment employment including testing dates and application forms.
rs and alumni may also use the office to establish credential files for ap-
ion to graduate schools and for employment. The office is open from
to 5 p.m. Monday through Friday, with evening hours scheduled dur-
ch semester. It is located at Woodhull House, 2033 G St., N.W.

inuing Education for Women Center

ntinuing Education for Women Center offers programs for those who
resume their education on a part-time basis. Opportunities are provided
cation, preparing for new careers, qualifying for job-promotion, further-
participating more effectively in community affairs, and enriching per-
es. Further information, including descriptive brochures, may be ob-
y calling 676-7036 or writing to the Continuing Education for Women
George Washington University, 2130 H Street, N.W., Washington, D.C.

enter services include: (1) group and individual counseling services
and evening; (2) off-campus credit courses at convenient hours and
(3) seminars and non-credit courses; (4) certificate programs; (5)
advising for those entering degree and nondegree programs; and (6)
designed courses and workshops for business and government agencies.

OUNSELING SERVICE

g *New Horizons for Women (Career Development-Life Planning),*
n program, enables participants to gain confidence and direction. They
lf-understanding through introspective and experiential exercises
rdized tests; set priorities; learn effective job-finding skills; assess
ook; examine educational opportunities, explore appropriate career
al options, and develop skills in decision-making.
ng New Horizons can be shaped to meet the needs of special popu-
as young adults, and international women and men. This program
adapted for the employees of an agency or business and offered to
roup in their own building.

Group counseling topics which can be arranged pertain to being single again the single parent, creative retirement, dynamic aging, and other areas o interest.

Groups are scheduled for day and evening hours on weekdays and Satur days in selected locations in D.C., Maryland, and Virginia. Individual counsel ing is a part of all group counseling.

INDIVIDUAL CAREER COUNSELING

This program is by appointment only and is conducted on a one-to-one basis Individual Career Counseling includes a battery of tests, independent study, and conferences with the counselor.

ACADEMIC ADVISING

The professional staff of the Continuing Education for Women Center advises women interested in enrolling in off-campus degree and nondegree programs. Counselors are available at dates and locations indicated for registration. Appointments can also be made for periodic advising sessions at the Office of Continuing Education for Women Center, 2130 H Street, N.W., Washington, D.C. 20052.

DAYTIME OFF-CAMPUS CREDIT COURSES

To enable women to continue their formal education, the Continuing Education for Women Center offers credit courses off campus at convenient hours and locations. Classroom space has been provided by churches and community centers in Alexandria, Arlington, Annandale, Falls Church, McLean, and Springfield, Va.; Bethesda, Chevy Chase, Kensington, and Rockville, Md.; as well as the District of Columbia.

Except for Education courses, which meet for 3 hours a week, each undergraduate course meets once a week for 2½ hours during the morning, afternoon, or evening. Although many take these courses to meet requirements for degree programs, students may also be accepted in a nondegree status. Those who complete credit courses as nondegree students are encouraged to apply for degree candidacy at George Washington University. Some need only specific courses to qualify for positions in business or government; others who already have degrees wish to qualify for professional certification. Many students in the program have had credits transferred to other colleges and universities throughout the country.

Government and industry have been granting leave for employees to enroll in daytime credit courses, particularly when the courses are job-related.

NONCREDIT COURSES

Selected noncredit courses and seminars, taught by academically qualified instructors, are offered through the Continuing Education for Women Center. These include: *Assertive Communication, Creative Writing, How to Study, LSAT Review, Nutrition & Mental Health, Overcoming Math Anxiety, Managing Stress, and Writing and Illustrating Children's Books.*

Legal Research, Legal Accounting, Legislative Process, Evidence, Virginia Practice, Real Property, and Administrative Law.

erview of Fund Raising (Philanthrophy: History & Philosophy and the d-Based Funding System), Communication Techniques for Fund Raisers ucing Successful Fund Raising Literature and Marketing the Nonprofit nization).

ndamentals of Editing and Writing, Printing Production & The Graphic Publication Design, Advanced Editorial Procedures, The Magazine Edi- Magazine Publishing (Consumer and Association), Audio-Visual Publishing, zine Design & Production, Book Design & Production, and Book Publish- The Washington Entrepreneur.

nference Planning, Long Range Planning for Administrators, Presenting erical Data, Office Administration, Behavior in Organizations, and Identify- e Power Structure.

r Certificate Programs

L ASSISTANT PROGRAM

g the fall of 1972, the Continuing Education for Women Center, in eration with the George Washington University National Law Center, ed the Legal Assistant Program. This one-year graduate-level academic am prepares men and women to assist lawyers in research, writing, and out-of-court functions. The program is offered both in D.C. and in ern Virginia. For admission to the program, an applicant must have helor's degree or the equivalent in education or experience.

SCAPE ARCHITECT ASSISTANT PROGRAM

-month certificate program in landscape and environmental design was ed during the spring of 1974. This program concentrates on drafting esign, and includes a survey of plant materials as well as lectures on aried aspects of the professional's work. Projects in residential, recrea- and urban design are studied along with construction details and graphic ing of plans. Classes are open to both men and women and are taught ofessional landscape architects and horticulturists. A college degree or alent education and experience is desirable for admission to the program.

ICATION SPECIALIST PROGRAM

e-year, graduate-level certificate program in publishing procedures began uary 1974. The program provides men and women with practical skills for careers in publishing and print communication. The main areas of are (1) editing and copywriting; (2) printing, layout, and design; and (3) -ation management. For admission to the program, an applicant must have helor's degree or the equivalent in education or experience. Post-certificate es in advanced publishing are offered to graduates and professionals in the

GEMENT SPECIALIST PROGRAMS

one-year certificate programs in administration and supervision are de- for persons preparing to advance in their current positions. These ams also incorporate college credits that may be used towards an aca-

demic degree or may serve as prerequisites for further study. A core group of credit courses and professional development seminars constitute these programs. They are offered two evenings a week plus two Saturdays each semester.

FUND RAISING ADMINISTRATOR PROGRAM

This intensive twelve month certificate program in fund raising provides the skills needed to plan campaigns, research potential donors and resources, write proposals, plan promotional and public relations activities, and understand the legal and tax complexities involved. Classes are taught by practicing professionals and are open to college graduates or those with the equivalent in education or experience.

Workshops and Courses On Site—Government and Business

The Continuing Education for Women Center designs programs for Federal agencies and private business and can offer on-site any course available through the Center. Programs to develop competence and upward mobility such as *Career/Life Planning,* which is an adaptation of *Developing New Horizons for Women, Secretaries—A Way Up, The Woman Manager, Equal Opportunity Awareness and Effective Communication.* These are custom designed and range from one day to several weeks.



Roland Jefferson, Botanist at the National Arboretum, discusses plant indentification with a student in CEW'S Landscape Architect Assistant Program.

LUMBIAN COLLEGE OF ARTS
D SCIENCES

FACULTY of Columbian College of Arts and Sciences has academic jurdion over the degrees of Associate in Arts in General Studies; Associate ience in Cartographic Science; Associate in Science in Geodesy; Bachelor neral Studies with areas of concentration in economics, history, law enment, mathematics, political science, psychology, and sociology; Bachelor ience in Cartographic Science; Bachelor of Science in Geodesy; and elor of Science in Oceanography. These off-campus programs are admind by the College of General Studies.

SSION

etailed information see "Admission as a Degree Candidate," page 17.

DEMIC WORKLOAD

full-time undergraduate student in Columbian College of Arts and Sciences not on probation may not ordinarily take more than 17 semester hours. dent employed more than 20 hours a week, who is not on probation, may e more than 10 hours.

full-time undergraduate student who is a candidate for a degree in Columollege of Arts and Sciences and who, during the immediately preceding er, has received no grades below *B* and has earned grades of *A* in three totaling at least nine semester hours may take 18 or 19 hours. An ed undergraduate student who, during the immediately preceding se-, has no grades below *B* and has earned grades of *A* in two courses at least six semester hours may take 12 hours.

udent on probation normally may not take more than three semester

udent who accepts employment after registration or at any time during ter must report that fact immediately to the dean so that the program adjusted, if necessary.

MPLETE/AUTHORIZED WITHDRAWAL

ons under which the grades of *I* (Incomplete) or *W* (Authorized With- may be assigned are described on page 33.

oving an Incomplete.—In Columbian College of Arts and Sciences the *I* must be removed no later than the last day of the examination period fall or spring semester immediately following the semester or summer in which the grade of *I* is assigned. An "Incomplete" that is not rewithin this period is automatically changed to an *F*. In cases of wellnted extenuating circumstances, an instructor and a student may jointly the appropriate dean, or the appropriate committee, for additional time h to complete the work of the course. Such petitions should be sub-

mitted within the same period. The grade of *I* cannot be removed by reregisterin for the course here or by taking its equivalent elsewhere.

PROBATION

A student who in one semester receives two grades of *F* in courses carryin three or more semester hours of credit each, or the equivalent, is placed o probation. A student in the first semester on probation who receives one grad of *F* in such a course will be considered on probation for a second semester Two grades of *D* will be treated as equivalent to one grade of *F* in determinin probation. Any grades of *D* or *F* replacing earlier grades of *I* will be con sidered a part of the record for the semester during which the *I* is removed A student on probation taking 12 or more semester hours whose grades are a *C* or better is removed from probation.

SUSPENSION

The following three cases constitute ground for suspension: (1) three grade of *F** in courses carrying three or more semester hours of credit or the equiv alent; (2) two grades of *F* when on probation; (3) one grade of *F* when in t second semester of probation. Two grades of *D* will be treated as equivalent to one grade of *F* in determining suspension. Any grades of *D* or *F* replacing earlier grades of *I* will be considered a part of the record for the semester during which the *I* is removed.

A student who is subject to probation for the third time, whether successive or after an interval, is suspended.

A student suspended for poor scholarship cannot register for courses even as an auditor. A student may apply for readmission after the lapse of either the fall or the spring semester. The student must then submit evidence to the Committee on Scholarship that he or she is better qualified to pursue college work. A student suspended twice for poor scholarship will not be readmitted.

USE OF CORRECT ENGLISH

Any student whose written or spoken English in any course is unsatisfactory may be reported by the instructor to the appropriate Dean. The Dean may assign supplementary work, without academic credit, varying in amount with the needs of the student. If the work prescribed is equivalent to a course, the regular tuition fee is charged. The granting of a degree may be delayed for failure to make up such deficiency in English to the satisfaction of the Dean

REQUIREMENTS FOR THE ASSOCIATE'S DEGREES

RESIDENCE

The last 18 semester hours must be completed in residence as a candidate for the Associate's degrees. A portion of the academic work taken to qualify for

* The rules governing probation and suspension are applicable as stated to students enrolled for full-time program (12 semester hours or more) during the fall or spring semester. Students enrolled for less than 12 semester hours during the fall or spring semester and students enrolled during the summer sessions are subject to probation or suspension on the basis of their record for 12 semester hours, or multiples thereof, rather than on their record in any one semester.

ee candidacy (see page 17) may be accepted in partial satisfaction of the ence requirement, if the courses are approved as part of the student's de- program.

UIREMENTS FOR THE BACHELOR'S DEGREES

DENCE

last 30 semester hours, including at least 12 hours in the area of concen- on, must be completed in residence as a candidate for the degree sought, special permission is granted by the appropriate dean to take work else- e. This requirement applies to students transferring within the University well as to students transferring from other institutions. The 15 hours taken ter to be considered for degree candidacy may be counted in residence. egulations governing military students who are transferred when they are six semester hours of their degrees, see page 36.

nsfers.—Transfer students from other colleges or universities must com- satisfactorily at least 12 semester hours of the required work in their area ncentration in residence as a candidate for the degree sought.

SSIONAL COURSES

ore than 12 hours of professional courses, e.g., courses offered in units University other than Columbian College, may be included in the hours ed for the bachelor's degrees in Columbian College. Students electing ional courses under this rule must obtain the approval of the Dean registration.

CIATE IN ARTS IN GENERAL STUDIES

Advisor: John H. McCalla, College of General Studies; Building F, Room 14, one 676-7016.

the satisfactory completion of the requirements set by Columbian Col- f Arts and Sciences, the degree of Associate in Arts in General Studies ferred. Students who plan to continue working toward an off-campus or's degree offered by Columbian College must apply to the Dean upon tion of the requirements for the degree of Associate in Arts in General s. Forms for this purpose are available at the College of General Studies.

r completing the requirements for the degree of Associate in Arts in l Studies, students may wish to transfer to an on-campus degree pro- within the University, or they may wish to transfer to another institu- However, modifications in admission, advanced standing, and curriculum ments permitted in the Associate in Arts in General Studies degree m may not be accepted in transfer. Therefore, while registered for this students should meet the requirements of the college, school, or uni- to which they wish to transfer. The entrance requirements of the col- nd schools of the University are stated in this catalogue and in the *raduate and Graduate Bulletin* of the University.

larship.—The system of grading is described on pages 32–33. For regu- concerning probation, suspension, and readmission, see page 46.

CURRICULUM

The satisfactory completion of 60 semester hours of college work in the f
lowing curriculum is required. Students who plan to pursue a Bachelor's
gree are advised to plan their Associate's program so that they will satisfy
prerequisites to the degree of their choice.

	Seme Hou
Communications	
Engl 9 or 10, 11	
SpDr 1, 11, 111, or 121	
Humanities	
Nine semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72; Mus 3, 4; Phil 50; Rel 9, 10, 59, 60	
Natural and Mathematical Sciences	
Three courses selected from the following: BiSc 3–4, 11–12; Chem 3–4, 5–6; Geol 1–2, 3, 4; Math 3, 6, 9, 10, 30, 31, 41, 42, 51, 52; Ocea 101, 102, 103–4; Phys 1, 2, 3, 4, 9–10; Stat 51, 54, 101–2	9-1
Social Studies	
Nine semester hours are required, each course chosen from one of two departments, selected from the following: AmCv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40, 71–72; PSc 1 or 3, 2; Psyc 1, 8, 22, 29; Soc 1, 2	9
Elective	21-3
Total	60

BACHELOR OF GENERAL STUDIES

Faculty Advisor: John H. McCalla, College of General Studies; Building F, Room 14, Telephone 676-7016.

The Bachelor of General Studies curriculum aims to provide the adult part-time student with the opportunity to obtain a broad education. For that reason the course work required in the first and second years is distributed among communications (written and oral), the humanities, natural and mathematical sciences, and the social studies. In choosing the third- and fourth-year courses work required in departments related to their concentration, students should obtain counseling through the faculty advisor.

Students planning to work toward master's degrees are advised to plan their bachelor's programs so that they will meet the prerequisite requirements of the school or college of their choice. Students planning to enter graduate programs which require a reading knowledge of a foreign language are advised to include two years of one foreign language in their bachelor's program.

Scholarship.—To qualify for graduation, 120 hours of course work must be passed and an index achieved of 2.00 based on courses passed with grades of *A, B, C,* or *D*. The index is obtained by dividing the number of quality points by the number of semester hours of courses passed with grades of *A, B, C,* or *D*. Both the number of quality points and the number of semester hours of

...es are based on the student's record at this University. The index is ...puted as follows: *A*, four points; *B*, three points; *C*, two points; *D*, one ...t for each semester hour for which the student has registered. Courses ...ted *F*, *W*, *I*, *NC*, or *CR* are not considered in determining the index, ...gh courses passed with *CR* count toward the 120 overall requirement. ...en a formal grade is recorded for an *Incomplete*, the new grade will be ...ded in the computation of the index.) Grades in courses taken at another ...ution are not considered in computing the index.

...dents must also achieve no lower than the grade of *C* in required courses ...e selected area of concentration. A *D* in a required course will satisfy a ...ular requirement in the area of concentration and may count toward the ... 120 hours, but it shall *not* count toward the minimum number of hours ...red in the area of concentration.

...e system of grading is described on pages 32–33. For regulations concern... ...robation, suspension, and readmission, see page 46.

...and Second Years

...MUNICATIONS	Semester Hours
...gl 9 or 10, 11	6
...gl 20	3
...0r 1, 11, 111, or 121	3

...NITIES*

...elve semester hours selected from the following: Art 31–32, 71–72; Engl ...44, 45–46, 51–52, 71–72; Foreign Language (2 years of one language); ...n 3 and 4; Phil 50; Rel 9 and 10, 59, 60; Slav 91–92	12

...URAL AND MATHEMATICAL SCIENCES

...to eight semester hours selected from the following: BiSc 3–4, 11–12; ...em 3–4, 5–6; Geol 1–2, or 3 and 4; Ocea 101, 102, 103–4; Phys 1 and ...or 3 and 4, or 9–10	6–8
...to eight semester hours selected from the following: Math 3, 6, 9, 10, ...31, 41, 42, 51, 52; Stat 51, 54, 101–2	6–8

...AL STUDIES

...elve semester hours selected from two of the following combinations: ...Cv 71–72; Anth 1–2; Econ 1–2; Geog 51 and 52; Hist 39–40, 71–72; ... 1 and 2, 2 and 3; Psyc 1 and 8, 1 and 22, 1 and 29; Soc 1 and 2	12
...ves (depending on science option)	8–12
	60

...ts who plan to continue study for advanced degrees are urged to fulfill the 2-year language

Third and Fourth Years

Concentrations are offered in economics, history, mathematics, political science, psychology, and sociology.

CONCENTRATION REQUIREMENTS (to be selected in consultation with the faculty advisor):

	Semester Hours
100-level courses in the department of the selected area of concentration....	2
Courses in two or more related departments.....	1
ELECTIVES	1
TOTAL	12

BACHELOR OF GENERAL STUDIES—AREA OF CONCENTRATION IN LAW ENFORCEMENT

Faculty Advisor: John H. McCalla, College of General Studies; Building F, Room 14 Telephone 676-7016.

Note: Applications are no longer being accepted for admission to the Bachelor of General Studies-Area of Concentration in Law Enforcement degree program. Those students who have been accepted as degree candidates may continue to pursue their program on—or off-campus until all graduation requirements have been met.

The Bachelor of General Studies degree with a concentration in law enforcement is designed for students who are now working as police officers or who are interested in future careers in law enforcement. The curriculum will provide a broad academic base in the arts and sciences, as well as professional competency to function effectively in investigative and regulatory agencies at the municipal, county, state, and federal levels. The scholarship requirements and system of grading is the same as for the other areas of concentration.

First and Second Years

ENGLISH	
Engl 9 or 10, and 11 or 12†	6
HUMANITIES	
Six semester hours selected from the following: Art 31–32, 71–72; Engl 43–44, 45–46, 51–52, 71–72; Foreign Language (beyond the first-group courses); Mus 3, 4; Rel 9–10, 59, 60	6

* Students selecting Psychology as an area of concentration are required to take 18 semester hours of 100-level Psychology courses; students selecting Sociology as an area of concentration are required to take 18 semester hours of 100-level Sociology courses. In both areas students must also take 9 semester hours of courses in two or more related departments.

† Campus course. See the current *Undergraduate and Graduate Bulletin* for course descriptions.

TURAL AND MATHEMATICAL SCIENCES	Semester Hours
ix to eight semester hours selected from the following:	
ISc 3–4, 11–12; Chem 3–4, 11–12, 15–16*, Geol 1–2; Phys 1, 2	6–8
ix semester hours selected from the following Mathematics combinations: and 10, 9 and 104*, 31 and 32, 51 and 52; Stat 51 or 54 or 101 in ombination with 97* or 102 or 105	6
REQUISITES	
Bc 2; Psyc 1 and 8; Soc 1	12
HONGLY RECOMMENDED	
oreign Language: First-group courses	
ECTIVES	22–24
	60

rd and Fourth Years

QUIRED COURSE WORK

LEnf 121:	Survey of Forensic Science I	3
LEnf 122:	Survey of Forensic Science II	3
LEnf 142:	Criminal Law and Procedure	3
†LEnf 180:	Law of Arrest, Search and Seizure	3
PSc 115:	U.S. Constitutional Law and Politics II	3
Psyc 101:	Abnormal Psychology	3
Soc 129:	Race and Minority Groups	3
†Soc 135:	Juvenile Delinquency	3
Soc 136:	Criminology	3
Soc 139:	Society and the Deviant	3
		30

CTIVES

y hours of electives are to be chosen in consultation with the faculty or. Nine semester hours must be elected in law enforcement courses; ining electives may be chosen from courses listed in the current *Undergate and Graduate Bulletin*. Courses numbered below 100 are more suitfor the first and second years. The following electives are in or are y related to the field of law enforcement.

BAd 102:	Fundamentals of Management
BAd 105:	Personnel Management
BAd 106:	Leadership in Personnel Management
Enf 123:	Criminal Investigation
Enf 131:	Police Organization and Administration II
Enf 141:	Criminal Evidence for Police
Enf 151:	Criminal Law in the District of Columbia

a course. See the current *Undergraduate and Graduate Bulletin* for course description.
rse descriptions in this bulletin for prerequisite courses.

LEnf 152:	Criminal Law in Maryland
LEnf 153:	Criminal Law in Virginia
LEnf 160:	Presentation of Testimony
LEnf 162:	White Collar Crime
LEnf 163:	Police and Community Relations
LEnf 164:	Evidence Photography
LEnf 165:	Organized Crime
*Phar 115:	Drug Abuse Education
PSc 111:	State and Urban Politics
*PSc 112:	State and Urban Policy Problems
Psyc 112:	Psychology of Adolescence
Psyc 144:	Personal and Industrial Psychology
Psyc 156:	Psychology of Attitudes and Public Opinion

Associate in Science in Cartographic Science

Associate in Science in Geodesy

Bachelor of Science in Cartographic Science

Bachelor of Science in Geodesy

Bachelor of Science in Oceanography

Faculty Advisor: Hyman Orlin, Professorial Lecturer in Cartography, Geodesy, and Oceanography; Telephone 946-3557. Counseling by appointment only, Telephone 676-7000.

The course work in these two- and four-year curricula is offered both on and off campus. However, the cartography, geodesy, and oceanography courses are given only at selected off-campus locations. Following is a listing of these off-campus locations, the distance from campus, and method of available transportation. Students attending these classes are expected to make their own arrangements for transportation. (Many students arrange private transportation on the first night of class.)

Facility	Distance in miles	Method of Transportation
NOAA-Gramax Building, 8060 13th Street, Silver Spring, Md.	9	Public
NOAA-Page Building, 3100 Whitehaven Parkway, N.W., Washington, D.C.	2	Public
NOAA-NBOC-2, 5640 Nicholson Lane, Rockville, Md., telephone 443-8626 for room assignments (Wisconsin Ave., Rt. 240)	20	Public
DMA-Hydrographic Office, Federal Office Bldg. No. 4, Suitland, Md.	12	Private
DMA-TOPO Command, 6101 MacArthur Blvd., N.W., Washington, D.C.	7	Public
U.S. Geological Survey, Reston, Va.	20	Private
St. Luke's Episcopal Church, Old Georgetown Road and Grosvenor Lane, Bethesda, Md.	20	Private

* Strongly recommended.

trance requirements are stated on pages 17–20; residence requirements ated on page 47.

e system of grading is described on pages 32–33. For regulations regard- robation, suspension, and readmission, see page 46.

e Associate in Science degree may be granted to a student who has com- d 60 semester hours in courses listed under either the cartography or esy option. The Bachelor of Science degree may be granted to a student has completed 120 hours in courses listed under either cartography, geo- or oceanography.

ral Requirements

candidates for the degree of Bachelor of Science will pursue a general and sciences curriculum until they begin work in their major field. Except wo general course requirements, all curriculum requirements leading to degrees are established by the major field program.

e two general requirements are the following:

Each student must, during the freshman year, demonstrate adequate vement in the field of English Composition, either by examination or by g English 9 or 10 and English 11 or 12. This requirement may not be oned.

Each student, at some point in the college career, must undertake a mean- l initiation into the three divisions of knowledge: humanities, natural and matical sciences, and social studies. As each major field will represent f these three areas, the requirement may be fulfilled by taking no less than nester hours in each of the other two areas. These six credits may be in ved introductory courses, or in approved advanced courses if the student lified and receives the instructor's permission. Courses simply waived (no assigned) cannot satisfy the meaningful initiation requirements. Depart- and programs are listed below under the three categories.

NITIES	NATURAL AND MATHEMATICAL SCIENCES	SOCIAL STUDIES
		American Civilization
sian Languages Literatures	Biological Sciences	Anthropology
	Cartography	Economics
nic Languages Literatures	Chemistry	Geography and Regional Science
	Geodesy	History
phy	Geology	Journalism
	Mathematics	Political Science
e Languages iteratures anguages iteratures nd Drama	Oceanography	Psychology
	Physics	Sociology
	Statistics	

E IN SCIENCE IN CARTOGRAPHIC SCIENCE

wing requirements must be fulfilled:

e general requirements in English.

requisite courses — Cart 1, 2.

uage courses (normally the first two years) are considered "tool studies" and are not fulfillment of "meaningful initiation" in the humanities.

3. Required courses in related areas — (a) Math 31, 32; (b) Geod 12, 17 106; (c) At least two courses from Geology, Physics, Chemistry, o Oceanography.
4. Required courses in the major — Cart 102, 104, 111, 115, 116, and 125 or 126. To remain in good standing and to qualify for graduation, a stu dent must maintain an average grade of *B* in required courses in the major.
5. Electives selected in consultation with the advisor. Recommended: Cart 107, 120, 121, 131; Geod 110, 117, 119, 150, 151.

ASSOCIATE IN SCIENCE IN GEODESY

The following requirements must be fulfilled:

1. The general requirements in English.
2. Prerequisite: Geod 17.
3. Required courses in related areas — (a) Math 31, 32, 33, 124; (b) Phys 1 or 3; (c) Cart 107.
4. Required courses in the major — Geod 106, 110, 150, 160, and at least one course from Geod 117 or 119, 151, 156, 161, 165–166. To remain in good standing and to qualify for graduation, a student must maintain an average grade of *B* in required courses in the major.
5. Electives selected in consultation with the advisor. Recommended: Math 139, 153, 157;* Phys 161;* Stat 157–158;* Ocea 101, 105, 110; Geol 1 or 3 or 21.*

BACHELOR OF SCIENCE IN CARTOGRAPHIC SCIENCE

The following requirements must be fulfilled:

1. The general requirements as stated above.
2. Prerequisite courses — Cart 1, 2.
3. Required courses in related areas—(a) Math 31, 32, 33; (b) Geod 12, 13, 17, 18, 106, 110; (c) At least four courses from Geol 1 or 3 or 21,* Phys 1 or 3, 14,* 15,* Chem 11–12, Ocea 101–102 or 103–104.
4. Required courses in the major — Cart 102, 104, 107, 108, 111, 115, 116, 120, 121, 125 or 126, 131. To remain in good standing and to qualify for graduation, a student must maintain an average grade of *B* in required courses in the major.
5. Electives selected in consultation with the advisor. Recommended: Geod 117, 119, 150, 156; Cart 113, 128, 135; Phys 11–12;* Ocea 11, 105; Math 124, 153.

BACHELOR OF SCIENCE IN GEODESY

The following requirements must be fulfilled:

1. The general requirements as stated above.
2. Prerequisite courses — Geod 17, 18.

* Campus course. See the current *Undergraduate and Graduate Bulletin* for course description.

Required courses in related areas — (a) Phys 1 or 3 and 15;* (b) Math 31, 32, 33, 124; (c) Cart 107; (d) Geol 1 or 3 or 21;* (e) Ocea 101 and 102 or 103–104, 105.

Required courses in the major — Geod 106, 110, 150, 151, 160, 161, and at least 4 courses from Geod 117, 119, 156, 158, 165–166. To remain in good standing and to qualify for graduation, a student must maintain an average grade of *B* in required courses in the major.

Electives selected in consultation with the advisor. Recommended: Math 113,* 139, 140, 141,* 142,* 153, 157;* Ocea 110; Phys 161, 162; Stat 106, 110, 114, 157–158.

Students considering graduate studies should acquire a reading knowledge of either French, German, or Russian.

ELOR OF SCIENCE IN OCEANOGRAPHY

following requirements must be fulfilled:

The general requirements as stated above.

Prerequisite courses — Ocea 11 or Cart 1, Ocea 101 and 102.

Required courses in related areas — (a) At least two courses from each of the following: Biological Sciences, Chemistry, Geology and Physics; (b) Math 31, 32, 33; (c) Cart 107, 108.

Required courses in the major — Ocea 105, 106, 110, 112, 114, 115, 120 and at least three courses from Ocea 111, 113, 122, 124, 130, 132. To remain in good standing and to qualify for graduation, a student must maintain an average grade of *B* in required courses in the major.

Electives selected in consultation with the advisor.

Students considering graduate studies should acquire a reading knowledge of either French, German, or Russian.

IAL DEGREE PROGRAMS

emen's Opportunity College (SOC)

ge Washington University has been designated a Servicemen's Opportun- llege (SOC). SOC provides opportunities for active duty servicemen and n to pursue educational program goals through courses offered on base, e evenings, on weekends, and at other nontraditional times. In sup- of the concept, George Washington University, while still maintaining its l academic standards, assumes the responsibilities of meeting the educa- needs of an individual serving in the Armed Forces. Provisions have established whereby these individual needs can be met. Specifically, in- uals who apply for admission as degree candidates for either the Asso- or Bachelor's degree from George Washington University's Columbian ge of Arts and Sciences may, at their request, be designated as SOC stu- Such students will be assured of a degree completion program through the agreement that follows:

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* course. See the current *Undergraduate and Graduate Bulletin* for course description.

AGREEMENT

George Washington University, a Servicemen's Opportunity College, agrees to the following:

I. Upon admission to Associate in Arts in General Studies or Bachelor of General Studies degree candidacy, the student may take the required course work either on or off campus. Regardless of where taken, courses of study taken while a degree candidate may be applied toward the degree sought, as a requirement or an approved elective. Although the grade of *D* is not acceptable for transfer, it may be used to satisfy a curriculum requirement. It may not, however, be counted toward the total number of semester hours required for the degree, and it should not be repeated. Courses will be taken from George Washington University unless the serviceman is transferred to a location not served by this University. In the case of transfer and in consideration of the student's future assignment, arrangements will be made between the student and the assigned counselor by the College of General Studies to ensure that the courses taken elsewhere satisfy the George Washington University program.

II. Academic credit may be obtained by any one or a combination of the following:

A. Registration as an on- or off-campus, full- or part-time student at this University.

B. Advanced standing for academic studies taken at other accredited institutions where such studies meet the requirements for the degree, or by examination. (A maximum of 42 semester hours allowed for the associate's degree; a maximum of 90 semester hours allowed for the bachelor's degree.)

Within the maximum of 42 hours of credit allowed for advanced standing toward the Associate in Arts in General Studies degree, a maximum of 30 hours may be obtained by any one or combination of the methods below. Within the maximum of 90 hours of credit allowed for advanced standing toward the Bachelor of General Studies degree, a maximum of 60 hours may be obtained by any one or combination of the methods below.

1. ***College-Level Examination Program (CLEP) Subject Examinations.***—CLEP Subject Examinations are offered in more than 20 subject areas. These tests measure achievement in the equivalent of specific college-level courses. (Credit may not be earned by passing the examination after having taken the equivalent course.) Maximum credit allowed for Associate's degree, 30 semester hours; maximum allowed for Bachelor's degree, 60 semester hours. A candidate for a degree from any school at this University must seek departmental approval *prior* to taking the examination in order to receive credit for a CLEP Subject Examination. (Credit—advanced standing—is not given for the college algebra-calculus, and college algebra-trigonometry subject examinations.)

2. ***College-Level Examination (CLEP) General Examinations.***—CLEP General Examinations are offered in five areas: mathematics; social sciences; humanities; natural sciences; and English composition. (Credit—advanced standing—is not given for the General Tests in English composition and mathematics.) Maximum credit allowed, 18 semester hours.

3. ***Columbian College of Arts and Sciences Special Departmental Examinations.***—A student may request any department of Columbian College to offer a special examination covering the subject matter of any specific course. (If an appropriate CLEP Subject Examination is available, the department may

onse to employ it.) The student who performs satisfactorily may receive
dit (advanced standing), waiver of requirement, or both, at the discretion
the department. (A student who has previously taken examinations to waive
rse requirements may not, however, at a later time take examinations for
dit in the same courses.) Special departmental examinations will normally
of at least three hours' duration. A fee of $25 for each course examination
harged for preparing, administering, and grading. Maximum credit allowed
Associate's degree, 30 semester hours; maximum allowed for Bachelor's
ree, 60 semester hours.

Service Schools.—A maximum of 30 (or a maximum of 12 hours if the
nes are "professional") semester hours may be obtained on the basis of
ice schools satisfactorily completed, as evaluated in accordance with the
ide to the Evaluation of Educational Experience in the Armed Forces,"
ed by the Committee on Accreditation of Service Experience. Ordinarily
subjects are counted as electives. No credit will be allowed for military
rience as such.

Correspondence Courses.—A maximum of 15 semester hours may be
ed through the successful completion of correspondence courses of college
which are offered by the U.S. Armed Forces Institute or a regionally ac-
ited college or university.

The minimum requirement for the Associate in Arts in General Studies
e is 60 semester hours; the minimum requirement for the Bachelor of
eral Studies degree is 120 semester hours. A minimum of 18 semester hours
he Associate's degree and a minimum of 30 hours for the Bachelor's de-
must be completed at George Washington University, but may be com-
d at any point in the student's program of study. At least 6 semester hours
e selected area of concentration must be taken at this University.

The College of General Studies will handle and coordinate administra-
matters and be the point of contact with the college granting the degree.
ovisions as stated in the *College of General Studies Bulletin* will apply
cases not specifically mentioned in this agreement.

Tuition and fees will be as stipulated in the *College of General Studies*
n on a year-to-year basis.

Students accepted under this program are subject to the probation and
sion regulations of the University, and are required to maintain scholas-
ndards.

In addition to trained counselors, University representatives are as-
to each installation to assist in the counseling function.

Help for Education and Development (Project AHEAD)

Washington University is cooperating with the U.S. Army in Project
D. The primary objective of the program is to permit affiliation of
d young persons with the University upon their entrance into the Army.
niversity will open and maintain an active record file and assign a coun-
the student while he or she is in the Army. In effect George Washington
ity becomes his or her alma mater. The counselor helps the student plan
rse of study and advises which courses to pursue among those offered on
the base or installation. After discharge from the Army, the veteran
as a full-time student to complete the degree. Individuals designated as

Project AHEAD students who desire to obtain an associate's or bachelor's degree from George Washington University's Columbian College of Arts and Sciences will be assured of a degree completion program through the following procedures:

Students who are admitted under normal rules and regulations are required to register and pay a continuous registration fee for one semester. Upon completion of that semester students present their active duty orders and will be granted military leave for the period of active duty.

A student who is not readily admitted will be required to complete a 30 semester hour pre-qualifying program based upon the student's needs as evaluated. Upon successful completion of the program at accredited colleges or universities, the student will receive advanced standing and be admitted as a degree candidate based upon the current catalogue at that time. After that the procedure outlined above will apply.

A time limit of five years is imposed from the time of admission or commencement of the pre-qualifying program for the student to be readmitted and commence resident requirements at George Washington University.

Accelerated Degree Completion Program

The Accelerated Degree Completion Program is available at Fort Myer in Virginia, and at the Washington Navy Yard in the District of Columbia.

This accelerated program may permit an individual to complete the degree of Associate in Arts in General Studies or Bachelor of General Studies in approximately 20 months through part-time study. Time to complete the program will vary according to the amount of advanced standing granted through transfer of credit or by examination and according to the number of courses the student is enrolled in. The program is designed for the highly motivated individual who must complete a program of study in a limited period of time. Classes are open to everyone.

GRADUATE SCHOOL OF ARTS AND SCIENCES

The faculty of the Graduate School of Arts and Sciences has academic jurisdiction over the degrees of Master of Arts in the field of Religion and Medical Care, Master of Arts in Special Studies, and Master of Science in Special Studies. When offered at off-campus locations these programs are administered by the College of General Studies.

MASTER OF ARTS

THE DEGREE OF MASTER OF ARTS with a field in Religion and Medical Care is a degree program offered by the Graduate School of Arts and Sciences under the direction of the Department of Religion.

The program of study is interdisciplinary and combines both professional
academic work. The intent of the program is (1) to provide training in
academic graduate milieu of chaplains and clergymen whose professional
ctiveness might be increased through the combination of clinical experience
academic study; (2) to provide a program of study for those medical stu-
ts who have a sense of the significance of theological insights for the care
he whole person and who desire to combine their medical education with
correlative study; and (3) to provide a program of research and study in
area of religion and medical care for those whose theological training (e.g.,
thics or sociology of religion) and interest are directed toward a vocation
eaching. Support for the program comes from (1) clinical training pro-
ns of the National Naval Medical Center, National Institutes of Health,
Walter Reed General Hospital; and (2) the departments of Health Care
inistration, Psychology, Religion, and Sociology, and departments of the
ol of Medicine and Health Sciences.

e program of study leading to the degree of Master of Arts in the field
eligion and Medical Care consists of 36 semester hours of approved course
with or without a thesis and the passing of a Master's Comprehensive
ination.

r information concerning admission requirements and the specific require-
s for the degree, contact the Graduate School of Arts and Sciences or the
nan of the Department of Religion.

TER OF ARTS IN SPECIAL STUDIES AND TER OF SCIENCE IN SPECIAL STUDIES

degree programs provide a course of study appropriate to those students
ish to emphasize interdisciplinary work. They are offered both on and
npus. The off-campus programs can only be offered for a group of stu-
with mutual educational goals. The programs allow a maximum of
ity; however, they must be developed around identified objectives and
rovide a structured sequence of study toward these goals. University
ntatives will work with interested groups to develop suitable programs.
ntemplated curriculum must be approved prior to admission to the
te School. A student interested in interdisciplinary work leading to one
degrees who is not in a group program must register on campus.
detailed information on the regulations of the Graduate School of Arts
ences, see the *Handbook for Graduate Students*, available at the office of
of the Graduate School of Arts and Sciences.

ic Workload

l-time student in the Graduate School of Arts and Sciences registers
to 12 semester hours each semester; a part-time student must register
emester hours each semester. These requirements do not apply when a
has fewer than nine semester hours (full-time) or six semester hours
e) remaining to complete the program. No student may take more
semester hours during any one semester.

n

led information, see "Admission as a Degree Candidate," page 17, and

Requirements for the Degrees

The program of study consists of 36 semester hours of course work includi
a majority of courses in the arts and sciences (e.g., economics, natural scienc
political science, psychology, sociology, statistics), with not more than on
third from any single department. *There are no thesis or tool requiremen*
Advanced undergraduate courses (those numbered 101–200) may be includ
in the program of study upon the approval of the Graduate School and wi
the provision that students complete additional work for graduate credit.

Each program of study must be approved by the dean of the Graduate Scho
of Arts and Sciences and the program advisors.

RESIDENCE

A minimum of 27 semester hours must be completed after admission to Ma
ter's degree candidacy.

SCHOLARSHIP

Graduate students are expected to maintain a minimum accumulative grad
average of *B* (3.00) in all course work in the program of studies. Individua
departments may require a higher average.

In the case of a student who receives a grade of *F* for a course in his pro
gram of studies, the Graduate School will require a departmentally approved
written statement justifying the student's continuance in the Graduate Schoo
and outlining the program to be followed. Continuation is contingent upon
the dean's approval. A course in the program of studies for which an *F* h
received cannot be subsequently removed from the program even though an
other course is taken as a substitute.

INCOMPLETE/AUTHORIZED WITHDRAWAL

Conditions under which the grades of *I* (Incomplete) and *W* (Authorized Withd
drawal) may be assigned are described on page 33.

Removing an Incomplete.—An "Incomplete" must be made up before the
lapse of one calendar year. An "Incomplete" which is not removed within one
calendar year remains as a grade of *I* on the student's record. The grade of *I*
cannot be removed by reregistering for the course here, or by taking its equival
lent elsewhere.

MASTER'S COMPREHENSIVE EXAMINATION

Master's degree candidates must pass a Master's Comprehensive Examination
administered by the Graduate School of Arts and Sciences on campus on
specified dates.

A student who fails to pass the Master's Comprehensive Examination may
in exceptional circumstances, and with the approval of the department and
the dean, repeat the examination at the next scheduled date. If the exam is failed
a second time, no further opportunity to take the examination is permitted.

Withdrawal

Graduate students who intend to withdraw from the Graduate School of Arts
and Sciences should inform the School in writing. The last day for comple

idrawal without academic penalty is at the end of the eighth week of
ses.

ve of Absence

student is temporarily unable to continue the program of studies, the stu-
t may request leave of absence for a specific period of time, not to exceed
calendar year. When the period of leave has expired, it is the student's re-
sibility to notify the Graduate School at least two months in advance of a
n registration period of the intention to reregister. If the student fails to
gister, candidacy will be terminated.

CIAL DEGREE PROGRAMS

ter of Arts in Special Studies (Criminal Justice)

rogram of study leading to the degree of Master of Arts in Special
ies with a concentration in criminal justice is offered off campus by the
duate School of Arts and Sciences. This interdisciplinary degree program
sts of study in criminology, forensic sciences, law, management science,
hology, and sociology, and is particularly appropriate for law enforcement
onnel or for students considering a career in law enforcement. For further
rmation, contact one of the following: Charles E. O'Rear, Chairman of
Department of Forensic Sciences, telephone 676–7319; the Office of the
of the Graduate School of Arts and Sciences, telephone 676–6210; or
ge of General Studies Staff Members—I. Ralph DeBelles, Manager of
ict of Columbia Programs, telephone 676–7061; Douglas Carter, Manager
laryland Programs, telephone 676–7022; Russell Lloyd Jr., Manager of
nia Programs, telephone 676–7040.

r of Arts in Special Studies (Legislative Affairs)

gram of study leading to the degree of Master of Arts in Special Studies
concentration in legislative affairs is offered off campus by the Graduate
of Arts and Sciences. The program, focusing on the Congress of the
States, includes course work in legislative theory and research, the pro-
of politics, and public policy analysis. For further information, contact
fice of the Dean of the Graduate School of Arts and Sciences, telephone
210, or James Halley, Education Specialist, College of General Studies,
ne 676–7067.

of Arts in Special Studies (Social Policies)

program of study leading to the degree of Master of Arts in Special
with a concentration in Social Policies is offered off campus by the
te School of Arts and Sciences. This interdisciplinary program focuses
al insurance and the political process in the United States. It covers
ajor aspects of social policy: social insurance, macro- and micro-
ics of social insurance, and the theory and practice of the U.S. political

process. For further information contact the Office of the Dean of the Gra
uate School of Arts and Sciences, telephone 676–6210, or Robert Engle, E
ucation Specialist, College of General Studies, telephone 676–7249.

Master of Arts in Special Studies (Urban Learning)

The program of study leading to the degree of Master of Arts in Special Studi
with a concentration in urban learning is offered off campus by the Gradua
School of Arts and Sciences. The curriculum is designed to improve the urb
educator's and city teacher's understanding of the environment in which he
she operates, with emphasis on social problems. For further information, co
tact the Office of the Dean of the Graduate School of Arts and Sciences, tel
phone 676–6210, or Norma Calhoun, Education Specialist, College of Gener
Studies, telephone 676–7023.

Master of Science in Special Studies (Environmental Science)

A program of study leading to the degree of Master of Science in Specia
Studies with a concentration in environmental science is offered off campus b
the Graduate School of Arts and Sciences. The curriculum is designed t
improve the student's understanding of the environment in which he or sh
operates with emphasis on problems of the work place. It includes industria
hygiene and health, environmental impacts, economics and resource manage
ment, technology and public policy, and biostatistics. The course of study wa
developed in cooperation with Department of Labor officials to meet the pro
fessional requirements of personnel in the occupational safety and health fields
For further information contact the Office of the Dean of the Graduate School
of Arts and Sciences, telephone 676–6210; or College of General Studies Staff
Members—I. Ralph DeBelles, Manager of District of Columbia Programs,
telephone 676–7061; Douglas Carter, Manager of Maryland Programs, tele
phone 676–7022; Russell Lloyd, Jr., Manager of Virginia Programs, telephone
676–7040.

Master of Science in Special Studies (Human Resource Studies)

A program of study leading to the degree of Master of Science in Special Studies
with a concentration in human resource studies is offered on campus on week
ends. The program gives students a broad base in economic policy, social and
behavioral theory, management theory and practice, and public policy ana
lysis, and seeks to provide policy analysts and management specialists an op
portunity to explore new conceptual developments and innovations where tra
ditional theories and earlier techniques are proving inadequate. Courses are
scheduled at the University campus two weekends each month, Friday evening
and all day Saturday, over a two year period. For further information contact
the Office of the Dean of the Graduate School of Arts and Sciences, telephone
676–6210; or Harvey Snyder, Education Specialist, College of General Studies,
telephone 676–7028.

Master of Science in Special Studies (Oral Biology)

In cooperation with the Army Institute of Dental Research of the Walter Reed
Army Medical Center, a program of study leading to the degree of Master o

ence in Special Studies with a concentration in oral biology is offered by
d Graduate School of Arts and Sciences. The program is open to dental
cers serving on active duty with the U.S. Armed Forces or with other fed-
l agencies. For further information, contact the Office of the Dean of the
aduate School of Arts and Sciences, telephone 676-6210, or Edward B.
ght, Education Specialist, College of General Studies, 676–7024.

ter of Science in Special Studies (Social and Economic Statistics)

program of study leading to the degree of Master of Science in Special
dies with a concentration in social and economic statistics is offered off
pus by the Graduate School of Arts and Sciences. The program is offered
y to students at the International Statistical Program Center of the U.S.
reau of the Census. It is designed to give a knowledge of the theories, con-
ts, principles, and literature of social and economic statistics, and back-
und and management leadership in staff development as it relates to plan-
g and implementation of statistical analyses. The curriculum includes
ographic and statistical methods, management and organization, and eco-
mic and social development. For further information contact the Office of
Dean of the Graduate School of Arts and Sciences, telephone 676-6210.

ter of Science in Special Studies (Telecommunication Operations)

rogram of study leading to the degree of Master of Science in Special
dies with a concentration in telecommunication operations is offered off
pus by the Graduate School of Arts and Sciences. This program is de-
ed to introduce personnel with technical backgrounds in communications
elated work in the field of business administration, economics, manage-
science, political science, sociology, and statistics. For further infor-
ion, contact the Office of the Dean of the Graduate School of Arts and
nces, telephone 676–6210, or one of the following College of General Stud-
Staff Members—I. Ralph DeBelles, Manager of District of Columbia Pro-
s, telephone 676–7061; Douglas Carter, Manager of Maryland Programs,
hone 676–7022; Russell Lloyd, Jr., Manager of Virginia Programs, tele-
e 676–7040.

OOL OF ENGINEERING AND APPLIED SCIENCE

faculty of the School of Engineering and Applied Science has academic
ction over the Master of Science, Master of Engineering Administration,
Doctor of Science degree programs. When offered at off-campus locations,
programs are administered by the College of General Studies.

TER OF SCIENCE

chool of Engineering and Applied Science in cooperation with the Na-
Aeronautics and Space Administration's Langley Research Center, Hamp-
rginia, has a graduate engineering program at NASA-Langley. NASA-

Langley's extensive scientific and engineering facilities and equipment are ava able to students in this program.

The programs at NASA-Langley lead to the degree of Master of Science the fields of acoustics, aeronautics, environmental modeling, structures and d namics, flight sciences, fluid mechanics, and thermal sciences, solid mechanic and materials engineering, electrical engineering, and computer science. The programs are open to qualified NASA employees and area residents. With approval of the instructor, courses may be taken in nondegree status.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, a pages 22–23.

Requirements for the Degree

The minimum Master's degree program consists of 24 semester hours of a proved graduate courses and a Master's thesis (equivalent to six semester hours The student may elect an optional program without a thesis which consists of minimum of 33 semester hours of approved graduate courses. All Master candidates are required to pass a Master's Comprehensive Examination. Stu dents whose undergraduate study does not include necessary prerequisites ma be required to take more than the minimum semester hours required.

Upon admission the student is assigned an advisor. Programs of study a determined by any prerequisites established and the requirements of the depar ment in which the student wishes to study. The program of studies in prepar tion for the Master's Comprehensive Examination must be approved by th student's advisor and the appropriate department chairman.

SCHOLARSHIP

Grades are indicated as *A*, Excellent; *B*, Good; *C*, Minimum Pass; *F*, Fail; a *CR*, Credit for satisfactory thesis completion. Whenever a grade is not assigne the symbol *I* (Incomplete) or the symbol *W* (Authorized Withdrawal) is r corded. Students who receive two grades of *F*, or three grades below *B*, a barred from further enrollment in graduate courses and, ordinarily, will not readmitted to graduate study.

GRADUATION REQUIREMENTS

Non-thesis Option.—A student may graduate with either:

1. 33 course credit hours of *B* or better with no more than two grades belo *B* of which only one *F* is permitted; or

2. A 3.00 quality-point index with a minimum of 33 course credit hours wi no more than two grades below *B* of which only one *F* is permitted.

Thesis Option.—In addition to 6 credit hours of acceptable thesis, a stude may graduate with either:

1. 24 course credit hours of *B* or better with no more than two grades belo *B* of which only one *F* is permitted; or

2. A 3.00 quality-point index with a minimum of 24 course credit hours wi no more than two grades below *B* of which only one *F* is permitted.

PLETE AUTHORIZED WITHDRAWAL

ions under which the grades of *I* (Incomplete) and *W* (Authorized awal) may be assigned are described on page 33.

oving an Incomplete.—Although the grade of *I may* remain on the rec- r a minimum of one year, the instructor should normally set a much period within which the uncompleted work must be made up. The f *I* cannot be removed by reregistering for the course here, or by taking ivalent elsewhere. An "Incomplete" which is not removed within one r year is automatically changed to an *F*.

NCE AND CONTINUOUS STUDY

rk for the degree must be done in residence except when special permis- granted by the chairman of the department. The student must maintain ous registration in the School. Failure to do so breaks the student's regis- and he must apply for readmission to the Master's degree program under er conditions and regulations are in effect at that time.

R'S THESIS

e programs requiring a thesis, the degree candidate must submit an ac- e thesis to demonstrate the ability to make independent use of the knowl- nd discipline of thought acquired and developed by graduate study, to objective evidence of constructive power in a given field, and to demon- hat the student can communicate the results of his or her work in writing. f a suitable character for which the student has professional responsi- nay be considered, whether done on or off campus, provided no sig- amount of work is completed without faculty supervision.

part of registration for the thesis course 299, the candidate must submit appropriate department chairman (on the form obtainable at the School the thesis area, approved by the faculty advisor. The thesis title must be ed to the dean, on the form available in the School office, at the begin- the semester in which graduation is expected. Registration in thesis 0 entitles the student, during such registration, to the advice of the mem- he faculty under whom the thesis is to be written. He may consult his but the thesis is the exclusive responsibility of the student.

thesis in final form must be submitted to the appropriate department an by the date stated in the calendar for the semester in which the can- nrolls in thesis 300. In case a thesis is unfinished on the date specified, dent will be granted an additional semester and must pay the "Continu- gistration" fee (see page 35) unless registered for course work. If the tion of the thesis extends beyond the three semsters, approval for an ex- of time will be required and the student must reregister for thesis 300 tuition as for a repeated course.

esis may be submitted in final form one time. The acceptability of the determined exclusively by the Master's Comprehensive Examination tee. If the thesis is unacceptable, the student's graduate status is termi-

ed copies of detailed regulations regarding the form and reproduction of is are available in the Office of the School. Accepted theses, with ac-

companying drawings, become the property of the University and are deposit in the University Library, where the duplicate copies are bound and ma available for circulation.

OPTIONAL MASTER'S PROGRAM WITHOUT A THESIS

The student may elect an optional program without a thesis which consists of minimum of 33 semester hours of approved graduate courses.

MASTER'S COMPREHENSIVE EXAMINATION

After completing the prescribed program, the candidate must pass a Master Comprehensive Examination, to demonstrate substantial understanding of pri ciples and method and their use in the area of interest. This examination m be written, oral, or both. A graduate student who fails any portion of the Ma ter's Comprehensive Examination on the first attempt may be examined o more time if approval is given by the appropriate Examining Committee. the event of failure to complete the examination satisfactorily, the student graduate status terminates.

TIME TO COMPLETE MASTER'S DEGREE REQUIREMENTS

A full-time master's candidate is allowed a maximum of three calendar yea to complete all degree requirements, from the date of his or her first graduat student status registration in prerequisite or graduate courses. A part-time ma ter's candidate is allowed a maximum of five calendar years. The time limit doe not include any period of registration as an unclassified student before admissio to graduate student status, nor does it encompass any specified period spent o approved leave of absence. Readmission is required upon expiration of leave o absence under the conditions and requirements then prevailing.

Students who do not complete degree requirements within the allowed tim have their graduate status terminated. They may be readmitted to graduat status under conditions specified by the department chairman and approved b the dean.

MASTER OF ENGINEERING ADMINISTRATION

The School of Engineering and Applied Science, in cooperation with Aberde Proving Ground, Md.; Aeronautical Radio, Inc., Annapolis, Md.; the Fairfa County Government, Fairfax, Va.; Goddard Space Flight Center, Greenbel Md.; Hunt Valley Industrial Complex, Cockeysville, Md.; Central Virginia I dustries, Lynchburg, Va.; NASA-Langley Research Center, Hampton, Va Naval Ordnance Station, Indianhead, Md.; and Richard Montgomery Hig School, Rockville, Md., offers a graduate program leading to the degree Master of Engineering Administration. The program is open to employees these organizations and area residents.

The School of Engineering and Applied Science has academic jurisdictio over this degree program which is administered by the College of Genera Studies.

ission

detailed information see "Admission as a Degree Candidate," page 17, and 22–23.

irements for the Degree

requirements for the degree of Master of Engineering Administration are ame as those listed under the degree of Master of Science.

TOR OF SCIENCE*

Doctor of Science degree program offered by the School of Engineering Applied Science is designed to prepare the student for a career of creative arship by providing a broad, balanced background of knowledge and guid- in the performance of research. It requires study of interrelated fields of ng as well as original research in the field of central interest. The doc- program for each student is determined, on an individual basis, by the nt and the advisor. Work for the doctoral degree must be done in resi- on campus except when special permission is granted by the chairman department.

sion

etailed information see "Admission as a Degree Candidate," page 17, and 23–24.

rements for the Degree

rogram of study for the degree of Doctor of Science is divided into two . The first—made up of a study of interrelated fields of learning which rts the general area of research concentration—culminates in the qualify- amination. The second—composed of research investigation of a partic- ubject in a special field and the presentation of such research findings in ien dissertation—culminates in the final examination. The general re- ents for the Doctor of Science degree are (1) a minimum of 30 semes- urs of course work beyond the master's degree in preparation for the ing examination; (2) a reading knowledge of one foreign language, pref- Russian; (3) the satisfactory completion of the qualifying examination; dissertation, equivalent to a minimum of 24 semester hours; and (5) the tory passing of the final oral examination.

candidate must submit to the appropriate department five complete copies dissertation and two original copies of an abstract (not to exceed 600 of the dissertation no later than the date specified in the calendar. One f the abstract is for inclusion in the announcement of the examination e for reproduction by University Microfilms, Inc. One copy of the dis- n is also sent to University Microfilms, Inc.

ed copies of detailed regulations regarding the form and reproduction dissertation, preparation of the abstract, and services offered by Univer- crofilms, Inc., are available at the School office. The successful candi- r the doctorate is required, prior to receiving the degree, to pay a fee to

e information on the Doctor of Science degree program is contained in the *School of g and Applied Science Bulletin*.

cover a part of the expense of printing the abstract of the dissertation, and the basic service rendered by University Microfilms, Inc. Accepted disse tions, with accompanying drawings, become the property of the Univer and are deposited in the University Library where bound copies are availa for circulation.

LANGUAGE REQUIREMENT

A doctoral student must have the capability of reading appropriate literature pu lished in a foreign language. Accordingly, a reading knowledge of one fore language, preferably Russian, must be demonstrated before admission to qualifying examination. If the student wishes to satisfy this requirement with language other than Russian, approval must be obtained from the doctoral a visor and the department chairman; permission to use a language other th Russian will be granted on the basis of its importance to the student's field interest.

TOOL REQUIREMENT

In addition to the language requirement, an examination in a tool requirem (e.g., computer programming) may be established by the various departmen

SCHOLARSHIP

To be admitted to the qualifying examination, the doctoral student must achie an over-all academic average of 3.20 on a scale of 4 (a grade of *A* equals points; *B*, 3 points; *C*, 2 points; and *F*, 0 points). No doctoral student may r ceive more than two course grades below *B*. If more than two course grad below *B* are received, his graduate study is terminated and his further enrol ment prohibited. Courses in which the student earns grades below *B* are n included in the total semester-hour requirement for the degree. In the event student receives any grade below *B*, he or she is required to consult with th advisor for a review of the program of study and discussion of possible chang therein.

SCHOOL OF EDUCATION AND HUMAN DEVELOPMENT

The faculty of the School of Education and Human Development has acade jurisdiction over the Master of Arts in Education and the Education Specia degrees. When offered at off-campus locations these programs are administe by the College of General Studies.

Academic Workload

A student registered in the School of Education and Human Develop may enroll for nine semester hours or more if attending on a full-time ba The maximum permissible load for a part-time student is six semester hours.

ension

raduate Suspension in the School of Education and Human Development.—
udent who receives the grade of *C* in more than six semester hours of work
bject to suspension. A student who receives a grade of *F* must confer with
ean before enrollment for further work.

STER OF ARTS IN EDUCATION

er of Arts in Education off-campus degree programs are designed for edu-
s who wish to increase their knowledge of professional and academic in-
ation and to prepare for special types of educational service in public and
te schools. They are also designed to further the preparation of indi-
als for non-traditional areas of education in both the public and private
rs of society, regardless of clientele, age, or institutional base.

e Master of Arts in Education degree programs offered at off-campus
rs are available in the following fields: elementary education; higher edu-
n; human resource development; secondary education; early childhood
l education; supervision and human relations; guidance and counseling;
g; and generic counseling.

sion

etailed information see "Admission as a Degree Candidate," page 17, and
20–21.

rements for the Degree

rogram of study consists of a minimum of 33, 39, or 42 semester hours of
work in core courses, depending upon the chosen field. The thesis
lent to six semester hours) is optional.

NCE

ced standing is granted for approved courses taken at other accredited
ions; however, a minimum of 24 semester hours must be completed at
iversity, with no less than 21 semester hours completed after admission
ter's degree candidacy.

RSHIP

ty-point index of 3.00 is required for graduation. Students who receive
of *C* in more than two courses are subject to suspension. Students who
a grade of *F* must confer with the dean of the School of Education
man Development before enrollment for further work.

LETE/AUTHORIZED WITHDRAWAL

ns under which the grades of *I* (Incomplete) or *W* (Authorized With-
may be assigned are described on page 33.

ving an Incomplete.—Although the grade of *I may* remain on the rec-
a maximum of one year, the instructor should normally set a much

briefer period within which the uncompleted work (usually the final exam tion or a required paper) must be made up. The grade of *I* cannot be remo by reregistering for the course here, or by taking its equivalent elsewhere. "Incomplete" cannot be made up after the lapse of one calendar year except written permission of the Dean's Council.

THE THESIS

Students who elect a thesis must register on campus for Educ 299–300. choice of the thesis subject must be approved in writing by the student's visor and filed in the office of the dean. A statement of the School of Ed cation and Human Development standards for the thesis and printed copies detailed regulations regarding the form and reproduction of the thesis are av able in the office of the dean.

Payment of tuition for the thesis entitles the candidate, during the period registration, to the advice and direction of the member of the faculty und whom the thesis is to be written. In case a thesis is unfinished, an addition calendar year may be granted without further tuition payment. The stude must, however, maintain continuous registration (see page 37) during th period. If the preparation of the thesis extends beyond the additional calend year, the student must register for the entire six hours of thesis again and pa tuition as for a repeated course.

TAKING COURSES ON CAMPUS

A student registered in a degree program off campus who wishes to register fo a course on campus, *must* file a formal graduate application which may be ob tained from the office of the dean of the School of Education and Huma Development.

MASTER'S COMPREHENSIVE EXAMINATION

In addition to the course examinations, the candidate may be required to pa a special three-hour comprehensive examination in the area of specialization Candidates for the examination must be registered for the semester during which it is to be taken, and must file a written application in the office of th dean of the School of Education and Human Development no later than days prior to the date of the examination. Degree candidates in programs quiring 33 semester hours may take an additional three credit hour course proved by the advisor in lieu of the comprehensive examination. Degree can dates in programs requiring 36 semester hours or more may waive the co prehensive examination with the approval of the academic advisor.

EDUCATION SPECIALIST

The School of Education and Human Development provides off-campus pr grams of advanced study leading to the degree of Education Specialist in t fields of Administration and Higher Education. The program is for students w master's degrees in education who seek further professional preparation.

ission

detailed information see "Admission as a Degree Candidate," pages 17 23.

irements for the Degree

inimum of 30 semester hours beyond the requirements for the degree of ter of Arts in Education at this University is required. At least 21 hours of work must be in courses offered by this University, on campus or in the oved off-campus degree center to which the candidate has been admitted; the approval of the advisor, the remaining semester hours of the program be taken at another approved university. A maximum of five calendar is allowed for the completion of the program. At least 12 of the required ours must be in appropriate graduate courses in education selected from following areas: (1) foundations and cognate study, (2) background and ral principles of the field of study, (3) an area of specialization.

OLARSHIP

larship requirements for the degree of Education Specialist are the same ose for the degree of Master of Arts in Education.

COMPREHENSIVE EXAMINATION

ssful completion of a six-hour written examination and/or an oral exami-n, at the option of the major field advisor, is required.

OOL OF GOVERNMENT AND BUSINESS MINISTRATION

TER OF SCIENCE IN ADMINISTRATION

chool of Government and Business Administration has academic juris- over the degree of Master of Science in Administration. The College of l Studies administers this program at off-campus locations. This degree m provides a course of study appropriate for those students currently g in government or industry. It is a professional degree, preparing tes for positions of higher and broader responsibility and generally ng their competence as administrators. Students expecting to continue ctoral program should consult the Committee on Doctoral Studies in the of Government and Business Administration concerning necessary isites. Students will usually find it advantageous to consult with the ttee early in planning their Master's degree programs.

University cannot guarantee that all courses in this curriculum will be at every off-campus center. However, any student who has been ad- o degree candidacy may arrange to complete the curriculum by regis-

tering on campus. All work for this degree must be completed in five yea unless an extension of time is granted by the dean. Continuous registrat does not extend a student's degree candidacy beyond the five-year time lin

Objectives of the School of Government and Business Administration

The principal objective of the School of Government and Business Administ tion is to prepare its graduates for positions in the management of complex ganizations in both business and government. The degree programs are signed to prepare students both for *entrance* into business and government a for *advancement* to high-level management positions.

Programs in the School include examination of administrative principles a quantitative approaches to decision-making common to both business and go ernment. These programs stress the points at which major policy decisions either business or government must give consideration to related policy de sions of the other. Emphasis is placed on the fact that management educati is not limited to organizational techniques but is, in the broadest sense, educ tion for management responsibility.

The degree of Master of Science in Administration develops the eleme common to all management positions regardless of the nature of the operatio This degree program is based on the study of the principles of managem human relations, and problem-solving, plus an area of specialization.

Admission

For detailed information see "Admission as a Degree Candidate," page 17, an pages 21–22.

Academic Workload

A full-time graduate student who is a candidate for a degree in the Scho of Government and Business Administration is normally expected to regist for nine to 12 semester hours each semester. A graduate student who is em ployed more than 20 hours a week may not take more than six hours.

Requirements for the Degree

RESIDENCE

A minimum of 27 semester hours of graduate work must be completed wh registered as a degree candidate in this off-campus program.

The thesis and thesis seminar (six semester hours) may be included in the hours of course work taken in residence.

PROBATION

A student whose quality-point index falls below 3.00 after completing a mi mum of 12 semester hours of graduate study will be placed on probation. probation extends through the period in which the student next attempts semester hours of graduate work, including prescribed courses. During period the student's performance will be monitored to determine suitability continued graduate study. A student who is subject to probation for a seco time is automatically suspended.

master's degree candidate who receives a grade of *F* is required to pre- cause for consideration by the dean, as to why continued study should mitted.

ENSION

duate student who does not meet the conditions of probation (see above) e suspended or asked to withdraw. A student who is suspended or with- under these conditions may apply for readmission after the lapse of one ter. To be readmitted the student must submit evidence which indicates mic success if readmitted. A student so readmitted will continue on aca- probation and must achieve a minimum quality-point index of 3.50 in xt 12 semester hours of graduate study. Should the student fail to achieve inimum quality-point index, a second suspension will result and sub- t readmission will be denied.

ARSHIP

erage of *B* or better is required for the Master's degree. The grade of *C* considered as failing but must be counterbalanced by a grade of *A* in a te course of equal status.

PLETE/AUTHORIZED WITHDRAWAL

ons under which the grades of *I* (Incomplete) and *W* (Authorized With-) may be assigned are described on page 33.

oving an Incomplete.—The grade of *I* must be removed no later than day of the examination period for the fall or spring semester immedi- llowing the semester or summer session in which the grade of *I* is as- An "Incomplete" that is not removed within this period is automatically to an *F*. In cases of well-documented extenuating circumstances, an or and a student may jointly petition the dean, or the appropriate com- for additional time in which to complete the work of the course. Such should be submitted within the same period. The grade of *I* cannot oved by reregistering for the course here, or by taking its equivalent re.

approval of the advisor, a thesis may be substituted for six semester course work.

hesis subject and the thesis in its final form must be approved by the of the thesis and the faculty advisor and presented to the dean of the f Government and Business Administration no later than the date an- in the calendar. Detailed regulations regarding the form and repro- of the thesis should be obtained from the School of Government and Administration.

nt of tuition for the thesis entitles the candidate, during the two of registration for thesis (299–300), to the advice and direction of ber of the faculty under whom the thesis is to be written. In case a unfinished, an additional successive academic year is granted without ition payment. The student must, however, maintain continuous regis- uring this period. If the preparation of the thesis extends more than

three semesters beyond the date the student registers for thesis 300, the ent six hours of thesis must be registered for again and tuition paid as for a peated course.

COURSE SUBSTITUTION/ELECTIVES

Course substitution and electives must be selected in consultation with t faculty advisor and may be chosen from relevant offerings in accounting, bus ness administration, management science, and public administration. Cours substitutions and curriculum modifications must be approved by the facult advisor and the dean of the School of Government and Business Administra tion. Electives need only be approved by the faculty advisor. Forms are avail able at the Office of Counseling and Student Services, College of General Studies

Master's Comprehensive Examination

Written Master's Comprehensive Examinations are required only in certain degrees and fields of concentration. Degree candidates should consult faculty advisors about examinations required and material to be covered. In writing the examinations students are expected to correlate what has been learned in course work and the literature of their field. The examinations normally re quire four to eight hours. Sections broadly cover the various fields which the candidate has selected for specialization.

Examinations are scheduled three times a year, late November or early De cember, April, and August, and should be taken during the last semester of course registration or shortly after completion of prescribed course work. If there is a lapse of time between completion of course work and taking the examination, students must maintain continuous registration and must be registered for the semester or summer session in which the examination is taken.

A written application is filed with the department supervising the student's field of study at time of registration for the semester in which the examination is to be taken. Before applying, the student must have completed all courses in the program or be enrolled in the last semester and must have achieved a 3.00 (B) average. After applying for the examination, a candidate may withdraw only by written notice to the Department Chairman.

A candidate who fails the examination should consult with the faculty advisor as to a subsequent course of action.

Areas of Concentration

The Master of Science in Administration degree program consists of 36 semester hours of graduate work. Each area of concentration includes a core of courses in economics, management science, and business-government relations. Courses are listed in the generally recommended sequence in which they should be taken. Faculty advisors should be consulted for more specific guidance. In areas of concentration where the course work requires prerequisites, these prerequisites generate semester hour requirements over and above the basic 36-hour program.

ADMINISTRATION OF SCIENCE AND TECHNOLOGY

dy Advisor: Daniel D. Roman, Professor of Management Science, Lisner Hall, m 601, 2023 G Street, N.W., Telephone 676-6678.

area of concentration explores the many aspects of technology relating to influencing research and development management, business, and public y. The employment of state-of-the-art technology and the creation of new nology through research and development are important processes in the evement of the objectives of both private firms and governments.

he research and development environment has many unique operational acteristics. The program of graduate study in this concentration has been ned to identify and study the problems associated with managing creative essional people in a dynamic technology. As a contextual area, the program es the need for students to undertake original and meaningful research ving political, economic, sociological, and operational problems encoun- by management in industrial, governmental, and military research and opment organizations.

Mgt 201: Advanced Administrative Management (3)
Mgt 230: Administration of Research and Development (3)
Mgt 225: Managerial Statistics I (3)
PAd 235: Seminar: Technology Change and Professional Human Resource Planning (3)
Econ 220: Survey of Principles and Issues in Economics
Mgt 232: International Research and Development (3)
Mgt 240: Survey of Information Technology (3)
Mgt 260: Introduction to General Systems and Cybernetics (3)
Mgt 207: Human Behavior in Organizations (3)
Ad 262: Seminar: Science, Technology, and Public Policy (3)
Mgt 239: Seminar: Administration of Research and Development (3)
Elective: To be selected with approval of advisor (3)

EHAVIORAL SCIENCES IN ORGANIZATION DEVELOPMENT

Advisors: Erik K. Winslow, Associate Professor of Behavioral Sciences, Rm. 204, 815 21st Street, N.W., Telephone 676-6447; Jerry Harvey, Pro- Management Science, Bldg. G, Room 102, Telephone 676-6205.

a of concentration reflects the assumption that the effective utilization behavioral sciences is concerned with both means and ends; that the t in behavioral science not only is skilled in theory and research but ies technical and specialized knowledge as a conscious force in effective tional growth and improvement. Thus, courses are designed to equip ent with organizational concepts and behavioral skills appropriate to g the utilization of a system's total resources.

rogram is designed to fulfill the need for professionals capable of de- creating, and developing the necessary behavioral and organizational ppropriate to rapidly changing societies. Emphasis is on the interrela- of such dimensions as motivation, leadership, problem-solving, organi- growth, and increased complexity of modern organizations and their n the function of organizational development.

mental listings in this bulletin for prerequisite courses.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
*†Mgt 208:	Current Issues in Organizational Behavior (3)
*†Mgt 210:	Behavioral Factors in the Process of Change (3)
*†Mgt 212:	Organizational Development: Concepts and Methods (3)
Mgt 260:	Introduction to General Systems and Cybernetics (3)
*Mgt 261:	Fundamentals of General Management Systems and Organizational Cybernetics (GEMSOC) (3)
Elective:	To be selected from the following as approved by the adviser (
BAd 211:	Leadership and Executive Development (3)
*†Mgt 213:	Consultative Processes in Organizations (3)
PAd 223:	Behavioral Factors in Large and Complex Organizations (3)
PAd 233: | †Psyc 245:	Seminar: Manpower Development and Utilization (3) / Seminar: Organizational Behavior (3)

III. BUSINESS FINANCIAL MANAGEMENT

Faculty Advisor: Rodney W. Eldridge, Associate Professor of International Financ Government Hall, Room 409, 710 21st Street, N.W., Telephone 676-6892.

This area of concentration provides a background in business budgeting, co trollership, treasury, long-range planning, reporting, and financial managemer processes. Courses are designed to emphasize the planning, analysis, implemen tation, and controls necessary for making effective financial decisions.

Mgt 201:	Advanced Administrative Management (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
BAd 202:	Business-Government Relations (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
*BAd 231:	Financial Decision-making (3)
*Acct 220:	Management Accounting (3)
*Mgt 225:	Managerial Statistics I (3)
*BAd 233:	International Business Finance (3)
*BAd 234:	Seminar: Capital Formation (3)
*BAd 237:	Investment Analysis (3)
Elective:	To be selected with approval of advisor (3)

IV. GENERAL MANAGEMENT SYSTEMS AND ORGANIZATIONAL CYBERNETICS

Faculty Advisor: Richard F. Ericson, Professor of Management, Lisner Hall, Roon 602, 2023 G. Street, N.W., Telephone 676-7155.

This area of concentration addresses the critical need for management to dea effectively with human institutions that tend to become larger and more complex In many traditional academic fields general systems and cybernetic concepts have evolved as the interdisciplinary mode for understanding increasingly com plex systems. This program is essentially interdisciplinary and transcontextua

* See departmental listings in this bulletin for prerequisite courses.
† Offered only on campus.

ure. The student is afforded a range of opportunities to apply educational ience to managerial, organizational and societal problems.

Econ 220: Survey of Principles and Issues in Economics (3)
BAd 202: Business-Government Relations (3)
Mgt 201: Advanced Administrative Management (3)
Mgt 204: Quantitative Factors in Administration (3)
'Mgt 207: Human Behavior in Organizations (3)
Mgt 240: Survey of Information Technology (3)
Mgt 260: Introduction to General Systems and Cybernetics (3)
'Mgt 261: Fundamentals of General Management Systems and Organizational Cybernetics (GEMSOC) (3)
'Mgt 263: Case Studies and Field Research in GEMSOC (3)
'Mgt 264: GEMSOC Modeling and Simulation (3)
Electives: To be selected from the following as approved by the advisor (6)
'Mgt 241: Management Information Systems Development and Application (3)
'Mgt 208: Current Issues in Organizational Behavior (3)
PAd 214: Policy Analysis in Public Administration (3)
PAd 262: Seminar: Science, Technology, and Public Policy (3)
Mgt 295: Research Methods (3)
'Mgt 225: Managerial Statistics I (3) (If this elective is chosen, Mgt 204 may not be taken.)
Econ 217–18: Survey of Economics (3–3) (If this combination is chosen, Econ 220 may not be taken.)

INDUSTRIAL MANAGEMENT

Advisor: Guy Black, Professor of Business Administration, Government Hall, 301, 710 21st Street, N.W., Telephone 676-7139 or (703) 278-8074.

area of concentration prepares students for careers in industrial manage- Work covers the organization and functioning of industrial firms as well management practice and problems associated with them.

'Acct 220: Management Accounting (3)
Econ 217: Survey of Economics (3)
Mgt 201: Advanced Administrative Management (3)
'Mgt 207: Human Behavior in Organizations (3)
'Mgt 225: Managerial Statistics I (3)
Mgt 240: Survey of Information Technology (3)
BAd 202: Business-Government Relations (3)
BAd 208: Personnel Management and Industrial Relations (3)
BAd 261: Applied Microeconomics (3)
BAd 279: Purchasing and Materials Management (3)
BAd 297: Business Policy Formulation (3)
Elective: To be selected with approval of advisor (3)

INFORMATION SYSTEMS TECHNOLOGY

Advisors: John F. McCarthy, Jr., Associate Professor of Business Adminis-, Bldg. G, Room 205, 815 21st Street, N.W., Telephone 676-7089; Walton E. Associate Professor of Management Science, Bldg. Y, Room 22, 2131 G N.W., Telephone 676-7159.

partmental listings in this bulletin for prerequisite courses.
d only on campus.

This area of concentration is designed to provide a managerial understa ing of the principles of manual, mechanical, and electronic informat processing, including computer programming concepts, methods, and langua an appreciation of the capabilities, limitations, and selection procedure of in mation processing equipment; a knowledge of all phases of management formation systems development, implementation, and evaluation; and an unc standing of the roles of both management and systems personnel in informat technology. It also provides an appreciation of the role of information te nology as a tool of management.

Students actually participate in the development of management informati systems; in the selection of computer equipment; and in the installation, ma agement, and evaluation of management information systems during cl sessions.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
Mgt 240:	Survey of Information Technology (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 260:	Introduction to General Systems and Cybernetics (3)
*Mgt 241:	Management Information Systems Development and Applicatio (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
*Mgt 242:	Comparative Computer Systems (3)
BAd 202:	Business-Government Relations (3)
*Mgt 243:	Management of Information Technology (3)
Electives:	To be selected with approval of advisor (6)

VII. INTERNATIONAL COMMERCE

Faculty Advisor: Jack Zwick, Professor of Business Administration, Governmen Hall, Room 402, 710 21st Street, N.W., Telephone 676-6726.

This area of concentration: prepares students for careers in firms operating on multinational basis or about to enter the international field; for careers in th federal government and in international agencies concerned with business, in dustry, and finance abroad; and for the commerce option of the Foreign Serv ice Officer Examination.

Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)
Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
*BAd 233:	International Business Finance (3)
BAd 248:	International Marketing (3)
BAd 255:	Multinational Corporations in the World Economy (3)
BAd 256:	Seminar: International Trade (3)
*BAd 257:	Business Policy in the Multinational Firm (3)
Elective:	To be selected with approval of advisor (3)

VIII. PERSONNEL MANAGEMENT

Faculty Advisor: Roy B. Eastin, Professor of Business Administration, Governmen Hall, Room 304, 710 21st Street, N.W., Telephone 676-6063.

* See departmental listings in this bulletin for prerequisite courses.

area of concentration provides a basic academic and professional founda-
equipping the student for administrative responsibility in personnel man-
ent. The courses cover the fields of personnel management, industrial
ons, unionism, collective bargaining, labor relations, and manpower de-
ment and utilization.

Mgt 201: Advanced Administrative Management (3)
Mgt 204: Quantitative Factors in Administration (3)
Mgt 207: Human Behavior in Organizations (3)
Mgt 240: Survey of Information Technology (3)
Econ 220: Survey of Principles and Issues in Economics (3)
BAd 202: Business-Government Relations (3)
BAd 208: Personnel Management and Industrial Relations (3)
BAd 209: Seminar: Personnel Management (3)
BAd 212: Unionism and Collective Bargaining (3)
BAd 213: Current Issues in Unionism, Collective Bargaining, and Labor Relations (3)
PAd 233: Seminar: Manpower Development and Utilization (3)
Elective: To be selected with approval of advisor (3)

PROCUREMENT AND CONTRACTING

Advisor: Stanley N. Sherman, Associate Professor of Business Administration, ment Hall, Room 412, 710 21st Street, N.W., Telephone 676-7462.

area of concentration provides a basic academic and professional founda-
equipping the student for administrative responsibility in procurement
ontracting. The courses cover industrial purchasing, procurement activi-
f the federal government, and contracting activities of vendors to the
l government.

Mgt 201: Advanced Administrative Management (3)
Econ 220: Survey of Principles and Issues in Economics (3)
BAd 279: Purchasing and Materials Management (3)
BAd 202: Business-Government Relations (3)
Mgt 204: Quantitative Factors in Administration (3)
Mgt 240: Survey of Information Technology (3)
BAd 280: Procurement and Contracting (3)
Mgt 207: Human Behavior in Organizations (3)
BAd 282: Government Contract Administration (3)
BAd 283: Pricing and Negotiation (3)
BAd 285: Systems Procurement and Project Management (3)
Elective: To be selected with approval of advisor (3)

UBLIC ADMINISTRATION

Advisors: David S. Brown, Professor of Management, Government Hall, 307, 710 21st Street, N.W., Telephone 676-6619; Stephen R. Chitwood, As-
Professor of Public Administration, Building D, Room 402, 2129 G Street, elephone 676-6064.

ea of concentration provides a background in the basic fundamentals
ic administration. The courses are designed to reflect the current theory

rumental listings in this bulletin for prerequisite courses.

as well as the practical and analytical concepts associated with the administ
tion of governmental functions. As the student will note, the area of conce
tration focuses primarily on the federal government. An option addres
urban and regional administration.

Core Courses

Econ 220:	Survey of Principles and Issues in Economics (3)
Mgt 201:	Advanced Administrative Management (3)
Mgt 204:	Quantitative Factors in Administration (3)
*Mgt 207:	Human Behavior in Organizations (3)

Area of Concentration

PAd 210:	Concepts and Issues in Public Administration (3)
PAd 213:	Administration in the Federal Government (3)
PAd 223:	Behavioral Factors in Large and Complex Organizations (3)
PAd 245:	Intergovernmental Relations (3)
PAd 251:	Governmental Budgeting (3)
PAd 260:	Policy Formulation and Administration (3)
Electives:	To be selected with approval of advisor (6)

Option in Urban and Regional Administration

To accommodate the needs of those students whose major interest is in urban
and regional public administration, the following curriculum may be under-
taken under special arrangements with the College of General Studies and the
department of public administration.

PAd 210:	Concepts and Issues in Public Administration (3)
PAd 223:	Behavioral Factors in Large and Complex Organizations (3)
PAd 245:	Intergovernmental Relations (3)
PAd 248:	Financing Local Government (3)
PAd 249:	Urban Public Policy (3)
PAd 250:	Administration of State and Local Governments (3)
PAd 260:	Policy Formulation and Administration (3)
Elective:	To be selected with approval of advisor (3)

XI. QUANTITATIVE ANALYSIS FOR DECISION-MAKING

Faculty Advisor: William W. Hardgrave, Associate Professor of Management Science,
Bldg. Y, Room 11, 2131 G Street, N.W., Telephone 676-6852.

This area of concentration develops an understanding of quantitative approaches
to problems of managerial control and decision-making. While the program will
develop a competent background in basic mathematical theory associated with
the various techniques, it is oriented towards applications of the techniques
rather than their theoretical mathematical content.

Mgt 201:	Advanced Administrative Management (3)
*Mgt 207:	Human Behavior in Organizations (3)
Mgt 240:	Survey of Information Technology (3)

* See departmental listings in this bulletin for prerequisite courses.

Econ 220:	Survey of Principles and Issues in Economics (3)
BAd 202:	Business-Government Relations (3)
*Mgt 225:	Managerial Statistics I (3)
*Mgt 226:	Managerial Statistics II (3)
*Mgt 227:	Mathematical Programming: Techniques and Applications (3)
*Mgt 228:	Techniques of Operations Research (3)
*Mgt 229:	Seminar: Management Science and Operations Research (3)
Electives:	To be selected with approval of advisor (6)

ter of Science in Administration—Special ICAF Program

operation with the Industrial College of the Armed Forces, Fort McNair, ington, D.C., a program of study leading to the degree of Master of Sci- in Administration is offered by the School of Government and Business inistration. The program is open only to current students and faculty of Industrial College of the Armed Forces. For further information, contact y R. Page, Faculty Advisor for the Industrial College of the Armed Forces ram, School of Government and Business Administration, telephone 6380, or LeRoy S. Paul, Education Specialist, College of General Studies, hone 676-7062.

*Departmental listings in this bulletin for prerequisite courses.



te Research Park, McLean, Va.—Locale for graduate programs in Business ial Management and Information Systems Technology offered by GW's of Government and Business Administration.

OFF-CAMPUS LOCATIONS OF THE COLLEGE OF GENERAL STUDIES

DISTRICT OF COLUMBIA

Bolling Air Force Base, Washington, D.C. 20332

Education Director: Edward Corbin
Office: Building 500
Telephone: 767-5348
Representative for the University: LeRoy S. Paul
Telephone: 676-7062
Open to military and civilian personnel

Federal After-hours Program

Representative for the University: Robert W. Stewart, Jr.
Telephone: 676-7018
Open to everyone

The following agencies participate in the Federal After-hours Program:

BUREAU OF CUSTOMS, WASHINGTON, D.C. 20229

James J. Doherty, Chief, Training and Career Development Branch
Office: U.S. Customs Service Academy, 3600 M Street, N.W.
Telephone: 634-5060

INDUSTRY AND TRADE ADMINISTRATION, WASHINGTON, D.C. 20230

Education Director: T. Bruce Robinson, Jr., Director, Employee Development Division
Office: Room 3525, Main Commerce Building, 14th Street and Constitution Avenue, N.W.
Telephone: 967-5075

DRUG ENFORCEMENT ADMINISTRATION, WASHINGTON, D.C. 20573

Education Director: Oscar Simon, In-Service Programs, National Training Institute
Office: Room 407, 1405 Eye Street, N.W.
Telephone: 382-4804

CIVIL SERVICE COMMISSION, WASHINGTON, D.C. 20415

For information contact Employee Development Officer, Personnel and Labor Relations Division
Office: Room 3H15, 1900 E Street, N.W.
Telephone: 632-5430

COAST GUARD, WASHINGTON, D.C. 20591

W.I. Barry, Chief, Training Section, Headquarters Civilian Personnel Branch (CAS-5/81)
Office: Room 8112B, Nassif Building, 400 7th Street, S.W.
Telephone: 426-2342

DEPARTMENT OF JUSTICE, WASHINGTON, D.C. 20530

Education Director: Jack Rottman, Chief, Career Development Section
Office: Room 1623, 10th Street and Pennsylvania Avenue, N.W.
Telephone: 739-5255

DEPARTMENT OF LABOR, WASHINGTON, D.C. 20210

Office: Room C5510, 200 Constitution Avenue, N.W.
Telephone: 523-6662

DEPARTMENT OF THE TREASURY, WASHINGTON, D.C. 20226

BUREAU OF GOVERNMENT FINANCIAL OPERATIONS

Training Officer: Mary M. Fuller, Manager, Employee Development Branch
Office: Room 544, Treasury Annex Number 1, Pennsylvania Avenue and Madison Place, N.W.
Telephone: 566-8775

GOVERNMENT OF THE DISTRICT OF COLUMBIA, WASHINGTON, D.C. 20001

Education Director: Edward E. Anderson, Acting Assistant Director, Employee Development and Services
Office: Room 207, 499 Pennsylvania Avenue, N.W.
Telephone: 629-2997

FEDERAL AVIATION ADMINISTRATION, WASHINGTON, D.C. 20591

Education Director: Phyllis Burbank, Employee Development Specialist
Office: Room 515, 800 Independence Avenue, S.W.
Telephone: 426-3320

FEDERAL COMMUNICATIONS COMMISSION, WASHINGTON, D.C. 20554

Education Director: Thomas Tate
Office: Room A-108, 1229 20th Street, N.W.
Telephone: 632-6394 or 632-6385

FEDERAL RESERVE BOARD, WASHINGTON, D.C. 20551

Education Coordinator: Gail Reichard, Resource Development Specialist
Office: 20th Street and Constitution Avenue, N.W.
Telephone: 452-3385

GENERAL SERVICES ADMINISTRATION, WASHINGTON, D.C. 20405

Training Officer: Joel B. Gerstle, Director, Training and Development Divisi
(BPT)
Office: Room 6215, 18th and F Streets, N.W.
Telephone: 566-1278

INTERNAL REVENUE SERVICE, WASHINGTON, D.C. 20224

David C. Barry, Chief, National Office Training Branch
Office: Room 1013, 1111 Constitution Avenue, N.W.
Telephone: 566-6101

INTERSTATE COMMERCE COMMISSION, WASHINGTON, D.C. 20423

Samuel D. Bingman, Jr., Director of Training
Office: Training Branch, Room 6363, 1200 Constitution Avenue, N.W.
Telephone: 275-7876

NATIONAL SCIENCE FOUNDATION, WASHINGTON, D.C. 20550

Career Development and Training Officer: Sandra Menke
Office: 1800 G Street, N.W.
Telephone: 632-4106

VETERANS ADMINISTRATION, WASHINGTON, D.C. 20420

Education Director: Raymond L. Butler, Chief, Employee Relations and Training
Division
Office: Room 100, Veterans Administration Main Building, Vermont Avenue
and H Street, N.W.
Telephone: 389-3101

Forrestal Building, L'Enfant Plaza, Washington, D.C. 20314

Education Director and Chairman of the Armed Forces Education and Training
Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 694-4514
Program Coordinators: Nancy Lane, Dee Umlauf
Office: Room GE222, Forrestal Building
Telephone: 693-8484 or 693-8485
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to active duty military personnel, Department of Defense civilians, retired
military personnel and other federal employees

Industrial College of the Armed Forces, Fort McNair, Washington, D.C. 20319

Coordinator: Bernard S. Waterman
Office: Room D–281, Industrial College of the Armed Forces

elephone: 693-8507
tor for the University: Harry R. Page
ffice: Room 308, Hall of Government, 710 21st Street, N.W.
elephone: 676-7250
esentative for the University: LeRoy S. Paul
elephone: 676-7062
to students and faculty of the Industrial College of the Armed Forces

ry of Congress, Washington, D.C.

ol Hill Graduate and Undergraduate Programs
esentative for the University: James Halley
elephone: 676-7067

l Research Laboratory, Washington, D.C. 20032

ation Specialist: Sylvia Wahler
ffice: Navy Research Laboratory, Bldg 72
elephone: 767-2956
esentative for the University: LeRoy S. Paul
elephone: 676-7062

l Security Station, 3801 Nebraska Avenue, N.W., Washington, D.C. 20390

ation Services Officer: Danny Snare
elephone: 282-0860
esentative for the University: LeRoy S. Paul
elephone: 676-7062

l Telecommunications Command, 4401 Massachusetts ue, N.W., Washington, D.C. 20370

ation Director: Allen Price
elephone: 282-0371
esentative for the University: LeRoy S. Paul
elephone: 676-7062

ed States Army Institute of Dental Research
er Reed Army Medical Center, Washington, D.C. 20012

William A. Ayer, Chief, Professional Development
ffice: Building 40
elephone: 576-3443
esentative for the University: Edward B. Wright
elephone: 676-7024
to military personnel assigned to duty and graduate study at USAIDR

er Reed Army Medical Center, Washington, D.C. 20012

ation Officer: Craig G. Matthews
ffice: Building B-12, Room 34
elephone: 576-2055 or 576-3187
esentative for the University: John Williams
elephone: 676-7029
to everyone

Washington Navy Yard, Washington, D.C. 20374

Glenn C. Archibald, Head, Education and Training Branch
Office: Building 92, Anacostia Naval Station
Navy Campus for Achievement: Jan Goldstien
Office: Building 92, Anacostia Naval Station
Telephone: 433-3182
Employee Development Officer: John Barber
Office: Room 202, Building 172, M and 9th Streets, S.E.
Telephone: 433-3188 or 433-3160
Representative for the University: James Halley
Telephone: 676-7067
Open to government and nongovernment employees

MARYLAND

Aberdeen Proving Ground, Md. 21005

Aberdeen Area Education Director: John L. Lichi, Chief, Educational Servic
Division
Office: Building 3146, Army Education Center, Aberdeen Proving Ground, M
21005
Telephone: (301) 278-3385
Representative for the University: John Williams
Telephone: (202) 676-7029
Open to everyone by permission of the Commanding Officer of Aberdeen Provin
Ground

Andrews Air Force Base, Washington, D.C. 20331

Education Services Officer: Lloyd J. Flynn
Office: Building 3484
Telephone: 981-6377
Representative for the University: John Williams
Telephone: 676-7029
Open to military and civilian personnel of the Air Force and to others by permissio

Defense Mapping Agency, Topographic Center, Bethesda, Md. 20315

Education Director: Gene Hastings, Chief, Training and Development Division
Office: Erskine Hall, 6500 Brooks Lane
Telephone: 227-2147
Representative for the University: John Williams
Telephone: 676-7029
Open to employees of the Defense Mapping Agency, Topographic Center, and others
by permission, obtained at least one week prior to the first week of classes, from the
Training and Development Division, Telephone 227-2147

Edgewood Arsenal, Md. 21010

Education Officer: Robert P. Mehr
Office: Building 4475, Edgewood Arsenal, Md. 21010
Telephone: (301) 671-2166
Representative for the University: John Williams
Telephone: (202) 676-7029
Open to everyone by permission of the Commanding Officer of Edgewood Arsenal

George G. Meade, Md. 20755

ation Director: Bruce Blevins
ffice: Building B393, Army Education Center
lephone: (301) 677-6421
entative for the University: John Williams
lephone: (202) 676-7029
to everyone by permission of the Commanding Officer of Fort George G.
e

ard Space Flight Center, Greenbelt, Md. 20771

Sieling, Employee Development
elephone: 982-4966
sentative for the University: Edward B. Wright
elephone: (202) 676-7024

gomery County Public Service Training Academy, Rockville, Md. 20850

ation Director: Karen J. Plucinski, Coordinator, Police Professional Advance-
Program
ice: Public Service Training Academy, 10025 Darnestown Road
lephone: 279-8250
entative for the University: Robert Engle
lephone: 676-7025
to Montgomery County employees and to others by permission

nal Naval Medical Center, Bethesda, Md. 20014

tion Director: Nick Szabados, Head, Training and Educational Services
ice: Building 123
lephone: 295-1751
entative for the University: Robert Engle
lephone: 676-7025
to military and civilian personnel of the Navy, employees of the National
utes of Health, and to others as space permits

onal Oceanic and Atmospheric Administration, Rockville, Md. 20852

tion Officer: Daniel E. Bella
ice: Room 316, North Bethesda Office Center II, 5640 Nicholson Lane, Rock-
le, Md. 20852
lephone: 496-8481
entative for the University: Robert Engle
lephone: 676-7025
to all employees of the Department of Commerce and to others by permission

l Academy, Annapolis, Md. 21402

dinator for the University Programs: William W. Jeffries, Archivist, U.S. Naval
emy
ice: Nimitz Library
lephone: (301) 267-2178
sentative for the University: Edward B. Wright

Telephone: (202) 676-7024
Open to military personnel, civilian government employees and to others by permission

Naval Air Station, Patuxent River, Md. 20670

Ted White, Head, Employee Development; Wanda Denton, Employee Development Specialist
Office: Naval Building 463, Civilian Personnel Department
Telephone: (301) 863-3734 or 863-3735
Representative for the University: Edward B. Wright
Telephone: (202) 676-7024
Open to military and civilian personnel of the Navy and to others by permission

Naval Graduate Dental School, Bethesda, Md. 20014

Commanding Officer: Captain Stewart R. Elder, USN
Education Director: Captain Richard G. Shaffer, USN
Office: Building 122
Telephone: 295-0064
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military personnel assigned to duty and graduate study at the Naval Graduate Dental School

Naval Ordnance Station, Indian Head, Md. 20640

Edward Drinks, Head, Training Division
Telephone: (301) 743-4506
Representative for the University: Edward B. Wright
Telephone: (202) 676-7024
Open to everyone by permission of the officer in charge of the station

Naval School of Health Care Administration, Bethesda, Md. 20014

Commanding Officer: CDR. William Auton, MSC, USN
Executive Officer: CDR Patrick Collier, MSC, USN
Office: Room 131, Building 141
Telephone: 295-1314
Representative for the University: Edward B. Wright
Telephone: 676-7024
Open to military personnel assigned to duty under instruction at the U.S. Naval School of Health Care Administration

Naval Ship Research and Development Center, Annapolis, Md. 21402

Jacqueline Nye, Head, Training Division
Telephone: (301) 227-1204 or 1169
Representative for the University: Edward B. Wright
Telephone: (202) 676-7024
Open to military personnel, civilian government employees and to others by permission

id W. Taylor Naval Ship Research and Development Center, Carderock, 20007

peline Nye, Head, Training Division
ffice: Room 113A, Building 8
elephone: 227-1204 or 227-1169
esentative for the University: Edward B. Wright
elephone: 676-7024
to military personnel and civilian employees of the Naval Ship Research and elopment Center and to others by permission

al Ships Engineering Command (see Prince Georges Center Building)

dawn Building, Rockville, Md. 20852

cation Director: Larry Livingston
ffice: Room 3A25, 5600 Fishers Lane
elephone: 443-7690
esentative for the University: Robert Engle
elephone: 676-7025
to employees of the Department of Health, Education, and Welfare and to s by permission

ce Georges Center Building, Hyattsville, Md. 20788

e: Civilian Personnel Office (Training), 3700 East-West Highway
esentative for the University: John Williams
elephone: 676-7029
to everyone

l Security Administration, Baltimore, Md. 21235

tor, Center for Continuing Education: Eric Levi
fice: Room 4-L-11, Annex Building, Division of Training and Career
velopment, 6401 Security Boulevard
lephone: (301) 594-4529
sentative for the University: Robert Engle
lephone: (202) 676-7025
to employees of the Social Security Administration and to others by permission

nd Federal Complex, DMA-Hydrographic Center, Suitland, Md. 20390

Rea, Head, Training Branch
ice: Main Building, Room 140
lephone: 763-1374
sentative for the University: John Williams
ephone: (202) 676-7029

nghouse Defense and Electronic Systems Center, Baltimore, Md. 21203

er, Education and Technology Training: Stanley F. Block
ce: Baltimore-Washington International Airport, Box 1693
phone: (301) 765-4447
ntative for the University: Edward B. Wright
lephone: (202) 676-7024
o Westinghouse employees and to others by permission

VIRGINIA

Ballston Towers #2, 801 N. Randolph St., Arlington, Va. 22203

Navy Campus Education Office: Betty Kirkpatrick
Crystal Plaza #6, Room 582
Telephone: 692-0198
Representative for the University: Herbert K. Berthold
Telephone: 676-7014
Classes are open to military and civilian personnel of the Department of Defense a
to others on a space-available basis.

Crystal City, Jefferson Davis Highway, Arlington, Va. 22203

(Including: Jefferson Plaza; Crystal Square; Crystal Mall; Crystal Plaza: Nation
Center)
Navy Campus Education Office: Betty Kirkpatrick
Crystal Plaza #6, Room 582
Telephone: 692-0198
Representative for the University: Herbert K. Berthold
Telephone: 676-7014
Open to military and civilian personnel of the Department of Defense and others o
a space-available basis.

Fairfax High School, 3500 Old Lee Highway, Fairfax, Va. 22030

Representative for the University: Jean Chen
Telephone: 676-7026

U.S. Army Engineer Center and Fort Belvoir, Va. 22060

Education Director: Eric Eber
Office: Building T-1483
Telephone: 664-6980
Representative for the University: Sandra Garcia
Telephone: 676-7063
Open to military and civilian personnel of the Army and to others by permission

Fort Myer, Va. 22211

Education Director: Maurice R. Lacey
Office: Building 303, North Post, Post Education Center
Telephone: 692-1460
Representative for the University: Harvey D. Snyder
Telephone: 676-7028
Open to military and civilian personnel of the Army and to others by permission

Hoffman Building, 2461 Eisenhower Avenue, Alexandria, Va. 22314

Education Director and Chairman of the Department of Defense Education and
Training Advisory Council: Philip F. Strauss
Office: Room 3C147, Pentagon
Telephone: 694-4514
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to active duty and retired military personnel and all federal employees

chburg Virginia Center, First and Merchants Bank Building, Room 606
chburg, Virginia 24504

ident Coordinator: K. Dallas Wade
Telephone: (804) 845-6035
esentative for the University: Alvin C. Jensen
Telephone: (202) 676-7020

uif Building, 5611 Columbia Pike, Falls Church, Va. 22041

MILITARY TRAFFIC MANAGEMENT AND TERMINAL SERVICE

Program Coordinator: Beth Todd Jones
Office: Room 734, Nassif Building
Telephone: 756-1088
Representative for the University: William C. Robinson
Telephone: 676-7064
Open to active duty and retired military personnel and all federal employees

Pentagon, Washington, D.C. 20310

ctor of the Pentagon Education Center, Chairman of the Armed Forces Educa- and Training Advisory Council, and Education Officer for the U.S. Army: p F. Strauss
ffice: Room 3C147, Pentagon
elephone: 694-4514

S. AIR FORCE

ducation Officer: Edwin Corbin
Office: Room 5E410, Pentagon
Telephone: 697-1863 or 697-7074
sentative for the University: William C. Robinson, Room 3C155, Pentagon
ntagon Telephone: 697-3141
niversity Telephone: 676-7064
only to active duty and retired military personnel and all federal employees

Geological Survey National Center, Topographic Division, 12201 Sunrise y Drive, Reston, Va. 22092

tion Officer: Ellen Antholis, Employee Benefits Officer
ephone: 860-6221
entative for the University: Jean Chen
ephone: 676-7026

ington National Airport (FAA), Washington, D.C. 20001

entative for the University: William C. Robinson
ephone: 676-7064

ate/Westpark, Rt. 123, Tyson's Corner, McLean, Va. 22101

entative for the University: Jean Chen
phone: 676-7026

Springfield High School, 6100 Rolling Road, Springfield, Va. 22150

ntative for the University: Sandra Garcia
phone: 676-7063
all qualified students

OFF-CAMPUS LOCATIONS OF EDUCATION COURSES FOR TEACHERS

DISTRICT OF COLUMBIA PUBLIC SCHOOLS

James T. Guines, Associate Superintendent of Instructional Services
Office: Room 903, Presidential Building, 415 12th Street, N.W.
Telephone: 724-4175
Representative for the University: Norma L. Calhoun
Telephone: 676-7023

Charles Tri-County Center, Waldorf, Md. 20601

Maurice Dunkle, Program Counselor
Office: Thomas Stone High School
Telephone: (301) 843-6461
Representative for the University: Kathleen B. McElroy
Telephone: (202) 676-7249

CALVERT COUNTY PUBLIC SCHOOLS, PRINCE FREDERICK, MD. 20678

David L. Brown, Director of Personnel Services
Office: Calvert County School Board, Dares Beach Road
Telephone: (301) 535-1700

CHARLES COUNTY PUBLIC SCHOOLS, LA PLATA, MD. 20646

Elwood M. Leviner, Director of Personnel Services
Office: Charles County Board of Education, Health and Education Buildin
Telephone: (301) 934-4671

ST. MARY'S COUNTY PUBLIC SCHOOLS, LEONARDTOWN, MD. 20650

Kenneth D. Rigby, Supervisor in Personnel
Office: St. Mary's County School Board of Health Building
Telephone: (301) 475-8971

Prince Georges County Public Schools, Upper Marlboro, Md. 20870

Maurice Erly, Coordinating Supervisor of Staff Development and In-Service Trainin
Office: Prince Georges County School Board
Telephone: 627-4800, Extension 218
Representative for the University: Kathleen B. McElroy
Telephone: 676-7249

TIDEWATER CENTER

George Washington University Tidewater Center: James Noel, Assistant Dean
Office: 2019 Cunningham Drive, Hampton, Va. 23666
Telephone: (804) 838-8444
Open to any qualified individual
Serves the cities in the Tidewater area of Virginia and the following governmen
installations:

np Elmore, Norfolk, Va. 23511

cation Officer: Capt. J. H. Andrews, USMC
Telephone: (804) 444-5617

t Eustis, Va. 23604

cation Director: Michael A. Yannitello
Telephone: (804) 878-5508

t Lee, Va. 23801

eral Education Director: William Brantley
Telephone: (804) 734-2605

t Monroe, Va. 23351

cation Director: Charles D. Fritts
Telephone: (804) 727-2454

t Story, Virginia Beach, Va. 23459

cation Director: E.F. Bolick
Telephone: (804) 422-7151

ded Missile School/Fleet Anti-Air Warfare Training Center, Dam Neck, inia Beach, Va. 23461

ational Advisor: William Eberling
elephone: (804) 425-4473

ational Director (Base): Cmdr. E. L. Daly
elephone: (804) 425-4184

ley Air Force Base, Va. 23365

tion Services Officer: Robert J. Dewey
lephone: (804) 764-5757

A-Langley Research Center, Langley Field, Hampton, Va. 23365

Training and Education Services Branch: Malcolm P. Clark
ephone: (804) 827-2611

Air Station, Norfolk, Va. 23511

tional Services Officer: Lt. J.G. J. Barnoski
ephone: (804) 444-3291

Air Station, Oceana, Virginia Beach, Va. 23460

ional Services Officer: Lt. S. B. Zysk
phone: (804) 425-2613
: John Quane
phone: (804) 425-3129

Naval Amphibious Base, Little Creek, Norfolk, Va. 23521

Educational Services Officer: PNCF Eugene B. Dickeite
Telephone: (804) 464-7811

Naval Supply Center, Norfolk, Va. 23512

Training Director: M. Marchesani
Telephone: (804) 444-4912

U.S. Atlantic Fleet, U.S. Naval Base, Norfolk, Va. 23511

Educational Services Officer: Lt. D. Gibson
Telephone: (804) 444-6945

U.S. Naval Regional Medical Center, Portsmouth, Va. 23708

Training Officer: Eugene Rogers
Telephone: (804) 397-6541, Extension 561

U.S. Naval Station, Norfolk, Va. 23511

NCFA: John O. Tompson
Telephone: (804) 444-7020



Roosevelt High School, District of Columbia—Off-campus location for the Urb
Learning graduate degree program, Graduate School of Arts and Sciences.

RSES OF INSTRUCTION

LLOWING PAGES CONTAIN LISTINGS AND DESCRIPTIONS of courses offered
departments of instruction and special interdepartmental programs.
carrying the designation "Campus Course" are normally offered only
pus. The courses as here listed are subject to change. The University
the right to withdraw any course announced.

ATION OF COURSE NUMBERS

ES AND SCHOOLS OTHER THAN ENGINEERING AND APPLIED SCIENCE

roup courses.—Courses numbered from 1 to 100 are planned for
in the freshman and sophomore years. With the approval of the
and the dean, they may also be taken by juniors and seniors. In certain
, they may be taken by graduate students to make up undergraduate
ies or as prerequisites to advanced courses, but they may not be tak-
raduate credit.

d-group courses.—Courses numbered from 101 to 200 are planned for
in the junior and senior years. Except for accounting courses, they
taken for graduate credit only upon the approval of the dean and the
r at the time of registration. Such approval is granted only with the
that students must complete additional work in order to receive
credit. Accounting courses numbered 101–200 may not be taken
uate credit.

group courses.—Courses numbered above 200 are planned primarily
uate students. They are open, with the approval of the instructor, to
seniors; they are not open to other undergraduates. Qualified seniors
g for Accounting, Business Administration, Health Care Administra-
nagement Science, or Public Administration courses must have a 3.00
the prior approval of the department chairman who is responsible for
uate course, the prior approval of the faculty advisor, and the prior
of the Dean of the School of Government and Business Administration.
ee students who have not completed a bachelor's degree may not en-
raduate courses offered by the School of Government and Business
tration.

SCHOOL OF ENGINEERING AND APPLIED SCIENCE

Courses numbered from 1 through 199 are planned for undergraduate cre
although certain courses may be taken for graduate credit when arrangeme
are approved in advance by the instructor and the dean. Courses numbe
201 to 300 are planned for graduate credit and may in certain instances
taken by qualified undergraduate students. Courses numbered from 301 to
are primarily for doctoral students.

SEMESTER HOURS OF CREDIT

The number of semester hours of credit given for the satisfactory comple
of a course is, in most cases, indicated in parentheses after the title of
course. Thus, a year course giving three semester hours of credit each sem
ter is marked (3–3), and a semester course giving three semester hours
credit is marked (3). A semester hour may be defined as one 50-minute per
of class work or one laboratory period a week for one semester.

ABBREVIATIONS

The following abbreviations are used by the University for course designatio

Acct	Accounting	**Geod**	Geodesy
AmCv	American Civilization	**Geog**	Geography and Regional Science
Anat	Anatomy	**Geol**	Geology
Anes	Anesthesiology	**Geop**	Geophysics
Anth	Anthropology	**Ger**	Germanic Languages and Literatures
ApSc	Applied Science	**HCA**	Health Care Administration
Art	Art	**HCS**	Health Care Sciences
ArTh	Art Therapy	**Hist**	History
Bioc	Biochemistry	**HKLS**	Human Kinetics and Leisure Studies
BiSc	Biological Sciences	**Idis**	Interdisciplinary Courses
BAd	Business Administration	**IAF**	International Affairs
Cart	Cartography	**Ital**	Italian
Chem	Chemistry	**Japn**	Japanese
CH&D	Child Health and Development	**Jour**	Journalism
Chin	Chinese	**Law**	Law
CE	Civil Engineering	**LEnf**	Law Enforcement
Clas	Classics	**Mgt**	Management Science
ClEn	Clinical Engineering	**Math**	Mathematics
CSci	Computer Science	**ME**	Mechanical Engineering
Derm	Dermatology	**M&PA**	Medical and Public Affairs
Econ	Economics	**Med**	Medicine
Educ	Education	**Micr**	Microbiology
EPol	Education Policy	**Mus**	Music
EE	Electrical Engineering	**NSur**	Neurological Surgery
EAd	Engineering Administration	**Neur**	Neurology
EngS	Engineering Science	**Ob&G**	Obstetrics and Gynecology
Engl	English	**Ocea**	Oceanography
EFL	English as a Foreign Language	**OR**	Operations Research
EnHe	Environmental Health	**Opth**	Ophthalmology
Envr	Environmental Studies	**Oral**	Oral Biology
Hum	Experimental Humanities	**Orth**	Orthopaedic Surgery
ForS	Forensic Sciences		
Fren	French		
Gnet	Genetics		

Otolaryngology
Pathology
Pharmacology
Philosophy
Physics
Physiology
Political Science
Portuguese
Psychiatry and Behavioral Sciences
Psychology
Public Administration
Radiology
Religion

SLP Service Learning Program
Slav Slavic Languages and Literatures
Soc Sociology
Span Spanish
SpEd Special Education
SpDr Speech and Drama
Stat Statistics
Surg Surgery
TCom Telecommunication Operations
U&RP Urban and Regional Planning
Urol Urology
WStu Women's Studies

nting

: A.J. Mastro, Professor of Accounting; Government 202, Telephone

nting courses numbered below the 200 level may not be taken for graduate ccounting courses numbered 201 and above may not be taken for under- redit.

Introductory Accounting (3–3)

Basic understanding of accounting concepts, procedures, analyses, and reports; the accounting measurement and communications of significant economic and financial data. Prerequisite to Acct 2: Acct 1. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 1.

Cost and Budgetary Control (3)

Cost behavior and volume-profit relationships, responsibility accounting, standard costs, flexible budgets, cost structures for control and motivation, relevant costs, cost concepts. Prerequisite: Acct 1–2. Students who have received credit for Acct 193 or 220 cannot receive credit for Acct 101.

Financial Statement Analysis (3)

Analysis and interpretation of financial statements for the guidance of management, directors, stockholders, and creditors. Prerequisite: Acct 1–2.

Financial Accounting (3)

Role of accounting in the decision-making of external parties; understanding, interpretation, and implementation of financial accounting. Students who have received credit for a similar financial accounting course cannot receive credit for Acct 115.

121 **Intermediate Accounting** (3)

In-depth study of accounting functions and basic theory; acquisitio assets and services, income and equity accounting, preparation and an sis of financial statements. Prerequisite: Acct 1–2.

132 **Accounting Theory** (3)

Current thought as reflected in the pronouncements of leading professi and accounting research associations, major contributions to accoun literature. Prerequisite: Acct 121.

141 **Governmental Accounting** (3)

Appropriation, encumbrance, and fund accounting for governmental institutional entities. Prerequisite: Acct 1–2.

161 **Federal Income Taxation** (3)

Federal income tax concepts applicable to individuals and corporati differences between tax accounting and financial accounting.

171 **Auditing** (3)

Principles and procedures of auditing: generally accepted auditing s dards, internal control, audit objectives and reports, form-preparation of audit work papers, audit evidence. Prerequisite: Acct. 121.

181 **Accounting Systems** (3)

Organization and use of accounting information: origination, classif tion, control, and reporting; development, design, and installation of counting systems; accounting communication patterns. Prerequisite: A 101, 171.

191 **Advanced Accounting** (3)

Application of accounting theory to special areas: consolidated stateme business combinations, earnings per share, foreign exchange, price-level justed statements, source and application of funds. Prerequisite: Acct

193 **Business Budgeting** (3)

Principles and procedures in the development, installation, and operat of a system of budgetary control to aid management. Prerequisite: A 1–2. Students who have received credit for Acct 101 cannot rec credit for Acct 193.

220 **Management Accounting** (3)

The role of accounting in the decision-making processes of managem understanding of how accounting influences resource allocation decision the organization. Prerequisite: Acct 115 or a similar financial accoun course. Students who have received credit for a similar management counting course cannot receive credit for Acct 220.

262 **Business Income Taxation** (3)

Federal income tax concepts applicable to corporations, partnerships, their owners; emphasis on tax planning factors in business decisions tax research.

275 **Contemporary Auditing Theory and Procedures** (3)

Study of auditing concepts: generally accepted auditing standards, app

tion of statistical sampling to auditing, audit of electronic data processing systems. Prerequisite: Acct 115 and 220, or equivalent.

276 **Management Planning and Control** (3)

Integrative case study approach to management systems for planning, control, and decisions: value indices for organizational subunits, transfer pricing, contemporary control systems, accounting, framework and cycle. Prerequisite: Acct 115 and 220, or equivalent.

282 **Accounting Information Systems** (3)

Development and application of accounting system theory, including analysis, design, and implementation. Integration of automatic data processing, accounting systems, and management information systems. Prerequisite: Acct 115 and 220, or equivalent.

296 **Seminar in Accounting** (3)

Selected accounting studies: critical analysis and evaluation developed in seminar discussions and papers. Prerequisite: Acct 115 and 220, or equivalent.

ican Civilization*

: H.F. Gillette, Jr., Assistant Professor of American Civilization, P-101, Tele-76-6070

72 **Introduction to American Civilization** (3–3) (Campus Course)

Themes and issues in American civilization since Colonial times, with emphasis on their contemporary importance.

92 **The American Cinema** (3)

History and criticism of American films. The course will enable the student to recognize and evaluate cinema techniques, to express the evaluation clearly in writing, and to understand the role of films in the context of American culture.

7 **Oral History and Interview Techniques** (3)
(Formerly four credits)

Introduction to theory and practice of obtaining and using historical data through recorded interviews. Examination of major published works in oral history. Particular attention to ongoing oral history projects in the Washington area.

Seminar: Scope and Methods in American Studies (3)

Consideration of American studies as an area for research and teaching; introduction to bibliography.

ed by the American Studies Program.
ng of the American Studies Program and the department of Speech and Drama.
ge of the American Studies Program and the department of History.

Anthropology

Chairman: R.L. Humphrey, Jr., Associate Professor of Anthropology; X-11, T
phone 676-6075

Departmental prerequisite: Anth 1–2 is prerequisite to all other courses in
thropology. This prerequisite may be waived by permission of instructor.

1–2 **Introductory Anthropology** (3–3)
Anth 1: survey of human origins, physical evolution, and culture histo
Anth 2: survey of the world's cultures, illustrating the principles of
tural behavior.

154 **Mythology and Folklore** (3)
Traditional verbal expression of supernatural or social beliefs; metaphor
thought; verbal art.

155 **Primitive Religion** (3)
Conceptions of the supernatural in nonliterate societies. Religious beli
and practices. Emphasis on religious process and change.

157 **Primitive Social Organization** (3)
Analysis of the social organization of primitive peoples; kinship,
nomic, and political systems.

171 **Native Peoples of North America** (3)
Comparative study of Indian groups representative of each of the c
tinent's culture areas.

185 **Latin American Archeology** (3)
Culture history of pre-Columbian Latin America from the Pal
Indian period through the Spanish Conquest, emphasizing the origin
development of Latin American high civilizations.

201 **Seminar: the Nature and Scope of Anthropology** (3)
Survey of the development of anthropological thought; examination of
subject matter, methodology, and theoretical approaches of anthropolo
especially as they relate to contemporary societies.

202 **Seminar: Recent Trends in Anthropology** (3)
Major topics of interest in contemporary anthropology since the m
20th century will be taken up in order, stressing current journal and mo
graph materials.

Art

Chairman: L.F. Robinson, Associate Professor of Art; Building H, Telephone 676-6

31–32 **Survey of Western Art** (3–3)
A foundation for further study in the history of art. Art 31: prehist
to Gothic art. Art 32: proto-Renaissance to contemporary art.

-72 **Introduction to the Arts in America** (3–3)
Art 71: Colonial beginnings to the republican age. Art 72: 19th century to the present.

109 **19th Century Art in Europe** (3)

110 **Contemporary Art** (3)

112 **Art of Egypt and the Ancient Orient** (3)
Study of the art of Mesopotamia, Anatolia, Egypt, and Persia.

113 **Baroque Art in Italy** (3)

115 **Christian Iconography** (3)
Origins and development of Christian symbols and themes from early Christian to modern times.

117 **Medieval Art I** (3)
Early Christian and Byzantine.

120 **Art of China and Japan** (3)

130 **Principles of Museum Work** (3–3)
Introduction to the history and development of museums; problems of museum administration, connoisseurship, cataloguing, installation, conservation, and educational service.

1 **Interior Design** (3)
Principles of decoration dealing with furniture designs and ensemble layout, draperies, color, accessories, and lighting.

5 **Folk Arts in America** (3)
Ceramics, woodcarving, ironwork, decorative painting, weaving, and other crafts.

5 **Etruscan Art and Archeology** (6)
Art and Archeology Program in Italy.

Primitive Art (3)

Etruscan Art and Archeology (6)
Art and Archeology Program in Italy.

al Sciences

S.O. Schiff, Professor of Zoology; Bell 314, Telephone 676-6090

ntroductory Biology for Nonscience Majors (3–3) (Campus Course)
Lecture (2 hours), laboratory (2 hours). Survey of biological principles; emphasis on man as a functional organism in his environment. Prerequisite o BiSc 4: BiSc 3. Material fee, $18 per semester.

ntroductory Biology for Science Majors (4–4) (Campus Course)
ecture (3 hours), laboratory (3 hours). Biological principles and prob-

lems designed to furnish a base for advanced studies in biology and re
sciences. Prerequisite to BiSc 12: BiSc 11. Material fee, $24 per seme

Business Administration

Chairman: S.F. Divita, Associate Professor of Business Administration; Go
ment 302, Telephone 676-6115

51 **Introduction to Business** (3)
Structure, activities, and problems of business enterprise; its contribu
to the individual and to society; careers in business.

101 **The Business Environment** (3)
Economic and legal environment of business enterprise; social and p
cal influences; contemporary problems and issues.

102 **Fundamentals of Management** (3)
Planning, organizing, directing, coordinating, and controlling activitie
the administrative unit; evolution of management thinking.

105 **Personnel Management** (3)
The labor force and labor markets. Industrial personnel and manpo
programs, organization and policy in personnel activities.

106 **Leadership in Personnel Management** (3)
A study of the philosophy, principles, policies, and programs for effe
personnel management and industrial relations as portrayed by case stu
drawn from business and government. Prerequisite: BAd 105 or per
sion of instructor.

107 **Collective Bargaining** (3)
American unionism and collective bargaining; economic, social, and p
policy considerations. The negotiation and administration of colle
bargaining agreements. Prerequisite: BAd 105 or permission of instru

113 **Real Estate** (3)
Principles of urban real estate practice; leasing and property managem
valuation, appraisal, financing, taxation, urban growth, urban rene

121 **Fundamentals of Insurance and Risk Management** (3)
Function of insurance and risk management in business enterprise.

131 **Business Finance** (3)
Analyzing capital requirements and methods of acquiring funds; plan
efficient use of capital. Asset management, financial analysis, source
funds, capital budgeting, stockholder relationships. Prerequisite: Acct
Econ 1; Math 30, 31; Stat 51.

132 **International Business Finance** (3)
Analysis of the international economic environment and its influenc
corporate financial management of international operations.

138 **Investment and Portfolio Management** (3)
Theory and principles of security analysis and portfolio management
cluding analysis of the national economy, industry, company, and se

markets. Risk-reward and computer-aided analysis. Prerequisite: Acct 1–2; BAd 131.

141 **Basic Marketing Management** (3)

Role of marketing in the socioeconomic system, consumer behavior analysis, impact of consumerism. Major decision areas of product planning, pricing and distribution; tools of marketing research and demand analysis. Prerequisite: Econ 1–2.

143 **Marketing Research** (3)

Basic methods and techniques of marketing research, problem definition, data collection, market survey and experimental design, data analysis and presentation. Special topics: attitude research, questionnaire construction and concept testing. Prerequisite: BAd 141.

161 **Commercial Law** (3)

Fundamental concepts and principles of law encountered in business activity; contracts, bailments, agency, sales, negotiable instruments, bankruptcy, other topics. Basic legal considerations in business decision-making.

171 **Transportation and Logistics Management** (3)

(Formerly Principles of Transportation)

Systems and alternatives of the logistics manager; carrier, user, and public policy perspectives; urban and inter-city mobility; cost, rate, competition, and service problems; public financing, and regulation of carrier enterprise; coordination of the modes of transportation.

175 **Introduction to International Business** (3)

Social, cultural, political, legal, and technological environment of multinational business, emphasizing host-government multinational corporation interface. Terminology, trade uses and practices, conditions essential for successful business operations, including export and import procedures, documentation, and legal requirements; physical movement of goods in international business.

178 **International Business Policy and Operations** (3)

Integration of functional activities in international and multinational firms, through selected case studies and discussions, to develop and stimulate decision-making from an overall business policy standpoint. Prerequisite: BAd 175 and advanced undergraduate standing.

Manufacturing Production (3)

Basic principles and methods of manufacturing production. Manufacturing facilities, plant and equipment. Illustrations selected from various process and fabrication industries. Prerequisite: Math 51, 52; Stat 51 or equivalent.

Business Policy and Administration (3)

Terminal undergraduate course in business administration. Integration of functional activities in arriving at overall business policy decisions. Prerequisite: BAd 102, 105, 131, 141, 181.

Business-Government Relations (3)

Regulatory and promotional activities of the government, independent regulatory agencies, antitrust activities, monetary and fiscal policy, regulation of labor-management relations.

208 **Personnel Management and Industrial Relations** (3)
Survey of personnel management practices and procedures, includ labor-management relations.

209 **Seminar: Personnel Management** (3)
Industrial personnel and manpower management, research in advan problems.

211 **Leadership and Executive Development** (3)
Theories of managerial leadership; issues and problems associated w leadership in large organizations and at higher management levels: ex utive selection and development. Prerequisite: Mgt 201 or permission instructor.

212 **Unionism and Collective Bargaining** (3)
The American labor movement. Collective bargaining and the conduct labor relations under collective bargaining agreements.

213 **Current Issues in Unionism, Collective Bargaining, and Labor Relations** (3)
Current problems and issues. Prerequisite: BAd 212.

231 **Financial Decision-making** (3)
Theory and practice of business finance with emphasis on special top within valuation including capital budgeting, mergers, acquisitions, ba ruptcy, and liquidation. Prerequisite: BAd 131 or 230.

233 **International Business Finance** (3)
Analysis of problems in international business finance. Impact of evolving international payments system on business. Prerequisite: B. 131 or equivalent.

234 **Seminar: Capital Formation** (3)
Determinants of saving and investment and resultant funds flow are evalu ed. Special emphasis on the level and risk structure and the structure of terest rates. The role and management of financial institutions is stress Prerequisite: BAd 131 or 230.

235 **Financial Management** (3)
Cases in financial management; planning financial structure, obtaini and managing capital, issuing and placing securities, administering incon security arrangements. Prerequisite: BAd 231.

237 **Investment Analysis** (3)
Risk-reward analysis of security investments including analysis of nation economy, industry, company, and market; introduction to portfolio m agement; emphasis on theory and computer methods. Prerequisite: B 131.

238 **Seminar: Investment and Portfolio Management** (3)
Portfolio management theory, application, and computer modeling. In pendent research on investment analysis and portfolio management w emphasis on theory, cases, and computer applications. Prerequisite: B 237.

239 **Financial Theory** (3)

(Formerly BAd 232 Capital Resource Management)

In-depth theoretical analysis of business financial topics including asset management, financial structure, dividend policy and the capital asset pricing framework. Prerequisite: BAd 231 and 237.

241 **Marketing Management** (3)

Marketing management problems; market segmentation, product planning, channels of distribution, advertising, personal selling, sales promotion, pricing and development of integrated marketing programs.

243 **Seminar: Marketing Research** (3)

Research as an aid to decision-making and increased efficiency in marketing, marketing research process, critical appraisal of methods and results, applications.

248 **International Marketing** (3)

Identifying and assessing international marketing opportunities in a dynamic world environment; developing multinational marketing strategy; multinational marketing product, pricing, channels, and communication programs management; planning, organizing, controlling, and decision-making emphasized.

55 **Multinational Corporations in the World Economy** (3)

Business in the world economy; multinational corporations as economic, political, and social institutions; ownership and growth strategies, relationships to other nations; national and international controls; future of the multinational corporation.

56 **Seminar: International Trade** (3)

Classical and modern concepts of international trade theory, instruments and institutions of trade policy, barriers to trade, preferential treatment and trading blocs, trends and issues.

57 **Business Policy in the Multinational Firm** (3)

Integration of functional activities of multinational enterprises from an overall policy position with emphasis on both domestic and international operations of the firm; problem-solving and decision-making in multinational companies; developing executives for international business. Prerequisite: advanced Master's standing.

1 **Applied Microeconomics** (3)

Applications of economic theory and statistics to business decisions involving demand, production, cost, profits, investments, and inventories. Prerequisite: Econ 217, Mgt 203, Stat 111; or equivalent; or permission of instructor.

2 **Applied Macroeconomics** (3)

Use of economic theory and statistics in business forecasting; interpretation of economic trends and developments; analysis of governmental economic policies. Prerequisite: Econ 218, Mgt 203, Stat 111; or equivalent; or permission of instructor.

Purchasing and Materials Management (3)

Industrial purchasing and materials management principles and practices. Organization and functions in materials management. Determination of requirements, source selection, buying practices, policies, and ethics.

280 **Procurement and Contracting** (3)

Principles and concepts essential to effecting large procurement progra Planning, sourcing, and contractual design for diverse acquisitions. E phasis on federal government policy with comparison of buying at ot governmental levels and the private sector.

282 **Government Contract Administration** (3)

Surveillance and management of contract performance. Measurement progress; specification interpretation; quality assurance; changes, negot tion, and adjustment; financial considerations; property; terminatio regulatory and policy concerns. Prerequisite: BAd 280 or permission instructor.

283 **Pricing and Negotiation** (3)

Scope and objectives of negotiated procurement; preparation, conduct, a recording of negotiations; analysis of cost, price, profit, investment, a risk; cost principles; incentives; relationship of contract type to work r quirements; techniques of negotiation. Prerequisite: BAd 280 or pe mission of instructor.

285 **Systems Procurement and Project Management** (3)

Major systems acquisition: needs, objectives, and organizational relatio ships. Design, establishment, and execution of project management pla procurement processes. Developing adequate intercontractual busine relationships within the environment of public procurement. Managemen of projects under contract.

295 **Research Methods** (3)

Theory and practice in research methodology. Data sources and gatherin research models and designs, analysis and testing, controls, interpretatio and presentation of findings.

297 **Business Policy Formulation** (3)

Analysis of operational situations and policy issues. Developing and im plementing solutions to managerial problems. Prerequisite: advance master's degree standing.

299 **Thesis Seminar** (3) (Campus Course)

Examination of thesis standards, research philosophy and methodology

300 **Thesis Research** (3)

Cartography*

Program Advisor: Hyman Orlin, Professorial Lecturer in Cartography, Geodesy, and Oceanography, Building F, Telephone 676-7000 or 946-3557

1 **Cartography I** (3)

Introduction to the fundamental concepts and practical applications o cartography. Prerequisite: Math 3, 6, or equivalent.

2 **Cartography II** (3)

Aerial photography, modern topographic and hydrographic mapping and

* Affiliated with the Department of Geography and Regional Science.

charting, thematic maps, map reliability, planning and design and reproduction. Prerequisite: Cart 1.

102 Elements of Remote Sensing (3)

Basic elements of remote sensing. Emphasis on the electromagnetic spectrum, infrared photographic systems, thermal systems, and analysis of multispectral photography and thermal imagery. General characteristics of satellite remote sensing. Prerequisite: Cart 1 and 2 (or equivalent experience), Geod 17, and Math 30.

104 Photo-interpretation (3)

Interpretation of topographic, vegetative, hydrologic, and man-made features. Civil and military applications. Applications to urban planning and urban-industrial patterns. Use of satellite imagery and remote sensing data. Color aerial photographs and underwater photography. Prerequisite: Cart 102, Geod 17, Math 30; or permission of instructor.

107 Physiography (3)

Development of physiographic concepts; the earth's crust, weathering, climate, and denudation; stream, shore, wind, and ice processes; glaciation; physiographic regions.

108 Climatology (3)

Causes for climate and weather, air mass movements, water mass movements, physical features of boundaries. Tropics, subtropics, humid and dry continentals, subarctics.

111 Cartographic Techniques (3)

Techniques and procedures, field methods, evaluation of source material, use of scribing and contact screens in color separation, shaded relief, and reproduction. Lectures and laboratory. Laboratory fee to be announced. Materials fee, $20. Prerequisite: Cart 2, Geod 12, Math 3, 6 (or equivalent experience).

113 Map Design (3)

Functional requirements of various kinds of maps. Principles of human perception and visual communication. Influence of reproduction processes on map design. Optimizing results within constraints of available source material, equipment, time, money, manpower, and reproduction process. Changing tradition of map design. Influence of experimental work and progress in the commercial and fine arts on map design. Role of map design in mapping organizations. Prerequisite: Cart 107 and 111.

115 Cartometrics I (3)

Examination of the application of automatic computing systems to cartography. Course will cover batch processing and time sharing and dedicated mini-computer systems as well as digitigers, plotters, and graphic terminals. Prerequisite: Cart 1, 2.

116 Cartometrics II (3)

Analysis of cartographic computing programs, cartographic data structures and automated mapping data bases. Examination of FORTRAN programming methods as they apply to cartography. Preparation of coordinate transformation programs, map projection programs, and plotting software. Prerequisite: Cart 115; Stat 97 or 106; or equivalent experience. Laboratory fee for computer use.

120 Computer Mapping I (3)

The analysis and application of computer mapping methods consistin the techniques for the automation of data bases and the creation of c puter generated map output. Students will develop application program laboratory sessions. Prerequisite: Cart 115, 116. Laboratory fee for c puter use.

121 Computer Mapping II (3)

Study of advanced applications of computer mapping methods and appl tions that include 2- and 3- dimensional automated plotter progra Course will include laboratory sessions and students will develop an vanced seminar project. Prerequisite: Cart 120. Laboratory fee for co puter use.

125 Marine Cartography (3)

Exploring the extended and imaginative symbology required to depic visually opaque environment characterized by sparsity of data; the th matic aspects of oceanographic mapping. Prerequisite: Cart 2.

126 Topographic Mapping (3)

The application of control surveys and photogrammetry to topograp mapping. National Map Accuracy Standards. Systematic application geographic names. Field completion. Feature classification and symbo zation. Map compilation and color separation. Comparison of Americ and foreign topographic maps and methodologies. Prerequisite: Cart 1(111; Geod 12, 13.

128 Thematic Mapping (3)

Analysis of the thematic map as a means of communicating qualitati and quantitative data. The function and design of base maps for th matic overprints. Source material research, analysis and manipulatic Map layout and symbol design. Experimental studies to compare t data the cartographer intends to communicate with the map and th actually extracted by the reader. Prerequisite: Math 30; Cart 111; a Stat 91 or 107.

131 Techniques in Remote Sensing (3)

The application of remote sensing to earth resource studies with er phasis on the physical characteristics of electromagnetic radiation, mu tispectral sensing, and photographic and digital image analysis. Satellite sy tems and the cartographic treatment of remote sensing data. Prerequisit Cart 102; Math 31; and Phys 1 or 3.

135 Cartographic Photography and Printing (3)

Historical development of map printing since the introduction of photo raphy. Comparison of printing processes. Contact and camera photo raphy. Light sources for the darkroom and exposure. Photograph emulsions, sensitometry and densitometry. Phototypography. Comparis of color-proofing methods. Registration systems. Plate making, pre work. Preparation of specifications for contractual printing. Quali control and other managerial problems. Prerequisite: Cart 111.

140 Sensitometry of Photomapping (3)

Construction of tone reproduction curves; optimization of photograph presentation; evaluation of photo materials, equipment and systems. Pr requisite: Math 30, Phys 1, or equivalent experience.

142 **Mechanics and Kinetics of the Photographic Process** (3)

Light, optics and photometry as applied to the photographic process; sensitometry and densitometry for quality control and assurance; density slicing; image enhancement; auto- and self-dodging; antivegnetting masks.

nistry

an: R.E. Wood, Professor of Chemistry, Corcoran 105, Telephone 676-6120

CAL SCIENCE

3–4 **Contemporary Science for Nonscience Majors** (3–3)
(Campus Course)

Lecture (2 hours), laboratory (3 hours). Contemporary topics in physical, biological, and medical science. Chem 3 is not prerequisite to Chem 4 but both courses must be satisfactorily completed to fulfill the meaningful initiation requirement. Laboratory fee, $20 per semester.

5–6 **Contemporary Science** (3–3)
(Formerly four credits)

Nonlaboratory course for off-campus students only. Survey covering topics in contemporary science: population control, pollution, drugs, food additives, etc.

STRY

12 **General Chemistry** (4–4) (Campus Course)

Lecture (3 hours), laboratory (3 hours), recitation (1 hour). Elementary course in general chemistry, including qualitative analysis. Prerequisite to Chem 11: one year of high school algebra. Prerequisite to Chem 12: Chem 11. Laboratory fee, $28 per semester.

01 **Environmental Science and Technology** (3)

Chemistry and physics of environmental pollution; emphasis on water and air pollution. Instrumental techniques and their limitations. Students present papers emphasizing chemical and physical aspects of an environmental pollutant.

e*

: C. Shih, Professor of Chinese; Library 613, Telephone 676-7106, 7263

2 **Beginning Mandarin Chinese, Level I** (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Fundamentals of grammar and pronunciation with graded reading and practice in writing. Prerequisite to Chin 2: Chin 1. Laboratory fee, $17.50 per semester.

4 **Beginning Mandarin Chinese, Level II** (3–3) (Campus Course)
Classroom (3 hours), laboratory (1 hour). Continuation of grammar and spoken Chinese with more emphasis on the written language and reading.

ed by the Department of East Asian Languages and Literatures.

Prerequisite to Chin 3: Chin 2 or equivalent. Prerequisite to Chin 4: C
3. Laboratory fee, $17.50 per semester.

13–14 **Reading Chinese for Beginners** (4–4) (Campus Course)
Basic grammar and syntax of modern Chinese; development of read
ability in beginners' textbooks and newspapers. Primarily for gradu
students wishing to acquire a reading knowledge without learning
speak or write the language.

Economics

Chairman: M.A. Holman, Professor of Economics; C-617, Telephone 676-6150

Departmental prerequisite: Econ 1–2 is prerequisite to all courses in Economi
except for Econ 217–18 and 220.

1–2 **Principles of Economics** (3–3)
Lecture (2 hours), recitation (1 hour). Survey of the major econom
principles, institutions, and problems in contemporary life. Econ 1: macr
economics. Econ 2: microeconomics.

101 **Intermediate Microeconomic Theory** (3)
Analysis of supply, demand, and pricing.

102 **Intermediate Macroeconomic Theory** (3)
Theories of national income determination and growth.

121 **Money and Banking** (3)
Nature of money, credit, commercial banking, and other financial institu
tions in the U.S. monetary system.

217–18 **Survey of Economics** (3–3)
For graduate students in fields other than economics. Econ 217: pric
theory. Econ 218: income and employment theory. Departmental pre
requisite waived.

220 **Survey of Principles and Issues in Economics** (3)
Survey of economic theory and its application to contemporary economi
problems. Departmental prerequisite waived.

236 **Economics of the Environment and Natural Resources** (3)
Analysis of public policy problems relating to the environment and nat
ural resources development and management.

241–42 **Labor Economics** (3–3)
Theory of wages and employment, analysis of labor supply and demand
Structural unemployment; occupational choice; labor market discrimina
tion.

243 **Seminar: Manpower Policy** (3)
Developments leading to expansion of public investment in manpower re
sources; evaluation of goals and operations of publicly supported pro
grams. Open to undergraduates.

h 247 **Seminar: Industrial Organization** (3)

Selected topics in regulatory economics and in antitrust economics during alternate years. Topic for 1978: antitrust problems. Prerequisite: Econ 101 or equivalent.

253 **Productivity Analysis** (3)

Concepts, measurement, and analysis of productivity in business and government at aggregate and organizational levels.

259 **Income Distribution** (3)

Theoretical and empirical analysis of income distribution, including analysis of policies related to income inequality. Open to advanced undergraduate economics majors.

ation

an: Donald Linkowski, Associate Professor of Education; C-514, Telephone 40

rimental prerequisite: A degree from an accredited institution and adequate rofessional preparation are prerequisite to courses in Education numbered 01 to 400.

00 **Special Workshop in Education** (arr.)

Topics to be announced in *Schedule of Classes.* May be repeated for credit.

12 **Educational Measurement** (3)

Basic measurement and evaluative techniques: selection, administration, and interpretation of standardized tests; test construction, evaluative procedures and statistical analysis of test results.

5 **Experimental Course** (arr.)

Courses being offered for the first or second time. Topics to be announced in *Schedule of Classes.* May be repeated for credit.

8 **Children's Literature** (3)

Lecture (2 hours), field work (2 hours). Newer books for children and the children's classics, contribution of literature to child development.

Supervised Experience in Education (3 to 6)

Field work, internship, and instructional practice: (1) adult education and human resource development; (2) college student development experience; (3) higher education; (4) museum education; (5) counseling. Admission by permission of instructor.

Special Workshop in Education (arr.)

Topics to be announced in *Schedule of Classes.* May be repeated for credit.

The Curriculum (3)

For experienced teachers. Curriculum foundations and issues, comparison

of curriculum patterns, curriculum development in subject areas, and gr consideration of student problems.

207 **Curriculum Materials** (3 to 6)

For experienced teachers. Construction of courses of study and classro teaching aids, with direct application to students' situations.

208 **Human Development** (3)

Consideration of human development and behavior throughout the span; emphasis on practical implications of relevant interdisciplinary search.

209 **Child Development** (3)

Interdisciplinary approach to child development and behavior. Practi implications of research in disciplines contributing to knowledge abo childhood.

210 **Adolescent Development** (3)

Interdisciplinary approach to adolescent development and behavior. Pra tical implications of research in disciplines contributing to knowled about adolescence.

212 **Quantitative Methods I: Introduction to Survey Measurement a Research** (3)

Introduction to measurement techniques and evaluation. Emphasis o application and interpretation of data-gathering techniques and descri tive statistics.

213–14 **History of Education** (3–3)

Educ 213: European origins of American education. Educ 214: evolutic of the American school system.

215 **Experimental Course** (arr.)

New courses being offered for the first or second time. Topics to b announced in *Schedule of Classes*. May be repeated for credit.

217–18 **Philosophy of Education** (3–3)

Educ 217: to help students formulate a personal philosophy of educatio Educ 218: social foundations of education—forces that shape policies an offerings of the school.

219 **Elementary School Classroom Procedures** (3)

Current theories of teaching and learning and their application to teacl ing strategies of elementary school teachers.

222 **Foundations of Reading Instruction—Early Childhood and Elemen tary School** (3)

Historical and psychological background; readiness, special approache and skills for beginning and elementary readers; evaluation of material demonstrations of classroom diagnostic and instructional techniques.

223 **Foundations of Reading Instruction—Intermediate and Secondar School** (3)

Historical overview and need for teaching reading on these levels; inform diagnostic techniques for content teachers; selecting materials; basic readir and study skills and their application in content areas.

224 **Diagnostic Teaching of Reading** (3)

Classroom diagnostic and instructional techniques for elementary school level; construction of informal tests; administration, scoring, and interpretation of informal and standardized tests; study of materials and application of readability formulas. Prerequisite: at least one previous course in reading instruction.

226 **Reading in Secondary School** (3)

Extension of diagnostic and instructional techniques in Educ 223; construction of informal tests; administration, scoring, and interpretation of informal and standard tests; evaluation of materials, including application of readability formulas; study of reading programs. Permission of instructor required.

227 **Basic Issues in Elementary Education** (3)

Identification, definition, and analysis of some of the most important problems facing the contemporary American elementary school.

228 **Instructional Areas in Elementary Education** (3)

Current trends and research in reading, language arts, social studies, mathematics, science, music, art, and physical education.

233 **Audio-visual Education** (3)

Lecture (2 hours), laboratory (1 hour). Selection, evaluation, and use of audio-visual materials; administrative problems in care, operation, maintenance, and use of such materials and equipment. Material fee, $7.

235 **Analysis of Teaching** (3)

Teaching as work: diagnosing learning skills, program planning and implementation, feedback information on both student and program.

236 **Introduction to Education Technology** (3)

Consideration of historical perspective, process, instrumentation, and implementation of self-instructional systems.

237 **Systems Approach to Instructional Design** (3)

Application of systems techniques to the development of instructional programs. A workshop design, using multi-media instruction.

241 **Education of the Gifted** (3)

For classroom teachers. Nature and discovery of giftedness, provisions for the gifted in regular classes, experimental projects.

242 **The Teacher and School Administration** (3)

Role of federal, state, and local administrative units; school finances; legal controls; school plant; public support; improving teaching conditions.

243 **Human Relations in Education and Management** (3)
(Formerly Human Relations in Education)

Principles and practices in human relations between and among learner, teacher, and other school personnel, parents, and community.

245 **School and Community** (3)

The school as an important member of a team of social agencies that builds the community.

247 Vocational, Technical, and Occupational Education (3)

Development, current concepts, agencies involved, problems and trend vocational, technical, and occupational education in the United States, emphasis on the community college.

248 The Teacher and School Supervision (3)

Nature, organization, human relationships, and techniques of school pervision.

250 Counseling Drug Abusers (3)

Counseling theory and practice applied to drug abusers. Crisis interv tion, self-help groups, and family therapy; individual and group couns ing.

251 Foundations of Counseling (3)

Introductory survey: definitions, scope, principles, historical backgroun organization, services, emerging trends, and issues.

252 Organization and Administration of Counseling Services (3)

Principles and procedures for designing and implementing counselin services. Admission by permission of instructor.

253 Individual Appraisal in Counseling (3)

Detailed study of individual analysis and appraisal techniques. Develop ment of systematic case study. Prerequisite: Educ 112 or equivalent.

254 The Middle School (3)

Development, organization, and practices; emphasis on the learner, th teacher, the administrator, the curriculum, and the setting of the schoo for the preadolescent.

255–56 Secondary Education (3–3)

Examination of historical, psychological, sociological, and philosophica bases; emphasis on prescriptive implications. Special attention to con temporary problems and practices.

257 Career Development and Information (3)

Theories of career development; factors influencing the world of work; pro cedures for evaluating and using socio-personal, educational, and occupa tional information.

258 Theories and Techniques of Counseling (3)

Theories and practices of vocational, educational, and personal counsel ing. Prerequisite: 12 semester hours in guidance and counseling, includ ing Educ 253 and 257.

259 Administration of the Elementary and Secondary School (3)

For experienced teachers and administrators. Survey of administration including practices of modern schools.

260 Supervision in the Elementary and Secondary School (3)

For experienced teachers and administrators. Review of modern supervisc ry concepts, including practices in schools.

261 **Practicum in Counseling and Human Development** (3)

Intensive counseling experience under supervision. Emphasis on relationship dynamics, analysis, recommendation, and follow-up. Separate sections offered for counseling majors and human development majors. Prerequisite: Educ 258.

263 **Human Resource Development: Training and Education** (3)

Concepts and purpose, historical backgrounds, roles of human resource development personnel, program areas. Prerequisite: adequate professional preparation or experience in training, education, and development.

264 **Design of Training Programs in Human Resource Development** (3)

Training, education, and development programs for various client systems will be planned using critical events conceptual model. Field work. Prerequisite: Educ 263 and permission of instructor.

-70 **School Business Management** (3–3)

Educ 269: philosophy, responsibilities, and functions of the business management office in public education institutions. Educ 270: practicum in educational business management.

275 **Seminar: School Finance** (3)

Educational financial theory, practice, and control, including methods of financing.

76 **Public Relations in School Administration** (3)

Purposes, gathering materials, disseminating agencies, publicity media, public participation in policy-making.

78 **School Law** (3)

Sources and scope of school law; legal rights and responsibilities of teachers, pupils, and taxpayers. Other legal problems of major interest to the group.

3 **Higher Education in the United States** (3)

History, scope, purpose, present status, programs and trends in higher education in the United States.

4 **Administration of Higher Education** (3)

Government, organization, and administration of colleges and universities; duties of trustees and administrators.

Planning, Organization and Coordination of Higher Education Student Activities (3)
(Formerly Student Activities)

Focus on the skills and knowledge needed by student affairs professionals, faculty advisors, and college administrators in planning, budgeting and dealing with policy issues related to campus programming. Includes program proposal preparation.

Planning the School Plant (3)

Selection of sites; evaluation of existing buildings; utilization of present facilities; adaptation to curricular needs; building, operation, and maintenance problems.

295 **Quantitative Methods II: Research Procedures** (3)

Required of all candidates for master's degrees in education. Analysi scientific approaches to problems in education; evaluation of rese techniques. Prerequisite: Educ 112, 212; or equivalent.

297 **Personnel Administration** (3)

Organization and administration of personnel programs for educati institutions. Basic philosophy, principles, responsibilities, and functi

299–300 **Thesis Research** (3–3)

Required of M.A. in Ed. degree candidates writing master's theses.

316 **Recent Developments in Elementary School Social Studies** (3 to *(Formerly Curriculum Developments in Elementary School Social Stud*

For experienced educational personnel. Research, techniques, materi and innovative programs relating to the effective elementary school so studies curriculum. Admission by permission of instructor.

317 **Recent Developments in Elementary School Science** (3 to 6) *(Formerly Curriculum Developments in Elementary School Science)*

For experienced educational personnel. Research, techniques, materi and innovative programs relating to the effective elementary school scie curriculum. Admission by permission of instructor.

320 **Recent Developments in Elementary School Mathematics** (3 to 6) *(Formerly Curriculum Developments in Elementary School Mathematics)*

For experienced educational personnel. Research, techniques, materia and innovative programs relating to the effective elementary school mat matics curriculum. Admission by permission of instructor.

324 **Teaching Reading and Study Skills at the College Level** (3)

Evaluation of reading skills at the college level. Development of colle reading programs, including diagnostic and teaching techniques, progra planning and implementation. Prerequisite: Educ 226, or equivalent a permission of instructor.

325 **Curriculum Theory** (3)

Examination of reviews and research studies in curriculum theory. Focu on trends, values, interpretations, fads, design systems, and evaluatio

343 **Advanced Studies in Human Development** (3)

Review and consideration of classical and empirical research studies selected topics in human development. Issues, instrumentation, and r search needs in respect to each topic discussed. Admission by permissio of instructor.

353 **Counseling Older Persons** (3)

Special considerations and counseling emphasis on second careers, retir ment adjustments, death and dying.

354 **Cross-Cultural Counseling** (3)

Problems of and procedures for counseling culturally different clien Emphasis on counseling cultural minorities in the United States.

355 Counseling in Groups (3)

Principles of group dynamics as related to interaction within groups. Techniques and practice in group counseling.

357 Personal and Social Adjustment (3)

Mental health problems; emphasis on needs of counselors, teachers, and others working with children and adolescents.

358 Advanced Theories of Counseling (3)

Critical analysis and evaluation of leading counseling theories and consideration of their implications for practice. Intended for Education Specialist and Doctor of Education degree candidates whose area of concentration is counseling. Admission by permission of instructor.

363 Psychosocial Aspects of Rehabilitation Counseling (3)

Impact of congenital and later disabilities on attitudes, self-concepts, and motivations. Implications for rehabilitation counseling. Admission by permission of instructor.

370 College Students and Their Community (3)

Survey of literature on the characteristics, behavior, and attitudes of the contemporary college student; college students' interaction with the environment. Admission by permission of instructor.

371 Principles and Practices in College Teaching (3)

General principles, methods, techniques, and experimental instructional media for teaching at the college and university level.

372 Internship in College Teaching (3 to 6)

Supervised experience in a selected area of college teaching. Prerequisite: Educ 371. Admission by permission of instructor.

373 The Community-Junior College (3)

The two-year college as it relates to secondary education, four-year colleges, and universities. Objectives, curricula, students, faculty, legal concerns, and special problems of two-year colleges.

374 Current Issues in Higher Education (3)

Prerequisite: Educ 283, 284.

375 Foundations of a College Student Development Program (3)

College student development as an integral part of higher education programs.

380 Sensitivity Training: Laboratory Method (3)

A sensitivity learning experience in human relations using unstructured group experience, individual feedback, experimentation, and practice. Admission by permission of department, prior to registration.

381 Adult Learning (3)

Learning theories as applied to adults in individual and group learning transactions; effect of age on learning; psychological, physical, and social environment in adult education situations.

382 Instructional Strategies in Adult Learning Programs (3)

Methods, techniques, and devices for adult learning; developing action-oriented learning situations in adult learning programs.

383 **Interviewing-Counseling for Human Resource Developers** (3)
Applications of interviewing, coaching and counseling skills for the h man resource development specialist and others in various occupatio settings.

384 **Evaluation of Adult Learning Programs** (3)
Evaluation of adult learning programs in business, industry, governme voluntary organizations and agencies.

385 **Collective Negotiations in Higher Education** (3)
Theory, practice, problems and issues in collective negotiations in high education.

386 **Current Issues in Adult Learning Programs** (3)
For M.A. in Ed. degree candidates. Current issues and trends in the fiel of adult education and human resource development. Admission of othe by permission of instructor.

387 **Administration of Adult Learning Programs** (3)
Program administration in school and non-school agencies, staff recruitme and development, fiscal operations, facilities, and maintenance of effecti community relations.

389 **Consultant-Client Relationship in Human Resource Development** (
Examination of the consulting process, consultant-client behaviors, an dilemmas using theory and field experience for individual and organiza tional development. Prerequisite: Educ 264, 280 *Program Planning i Adult Education (3);* or approval of instructor.

390 **Legal Problems in Higher Education** (3)
Investigation of legal problems in higher education related to legal structur of higher education, religion, students, faculty, and academic program.

391 **College and University Curriculum** (3)
Development, patterns, creative design, issues, problems, evaluation, an trends in the higher education curriculum.

392 **Financing Higher Education** (3)
Analysis of private, state, and federal revenue sources; student aid, pro gram budgets, and financial methods and practices.

393 **Practicum in Higher Education** (3 to 6)
Supervised field experiences in higher education; reports and conferences Admission by permission of instructor.

394 **College and University Governance** (3)
Organizational and administrative structures, patterns, and relationship in higher education. Prerequisite: Educ 284.

395 **Problems and Practices in Educational Administrative Organization** (3 to 6)
Application of principles and practices concerned with change and evalu ation of educational administration.

399 **Seminar: Applied Educational Administration** (3 to 6)
Application of the theories and principles of administration to the publi schools. Student participation with guidance by recognized regional prac titioners.

ate Director, Joint Institute for Advancement of Flight Sciences, NASA-Lang-raduate Program: S.W. Yuan, Professor of Engineering and Applied Science, kins 306, Telephone 676-6665

on Advisor of Coastal Engineering Research Center, Fort Belvoir, Va.: J.E. rofessor of Civil Engineering, Tompkins 109, Telephone 676-7179

ED SCIENCE

115 Engineering Analysis III (3)

Solution of engineering problems using concepts from probability and statistics, including random variables, distribution functions, mathematical expectation, point and confidence interval estimation, hypothesis testing, correlation, and regression. This methodology applied to problems of structural design, bioengineering, manufacturing processes, product quality, equipment reliability, engineering management, and societal engineering. Prerequisite: Math 32.

211 Analytical Methods in Engineering I (3)

Engineering applications of the theory of complex variables including contour integration, conformal mapping, integral inversion, and boundary-value problems. Prerequisite: approval of department.

212 Analytical Methods in Engineering II (3)

Analytical methods appropriate to the formulation of engineering problems including finite dimensional vector spaces, eigenvalue problems, generalized Fourier series, tensor calculus, curvilinear coordinates. Prerequisite: approval of department.

213 Analytical Methods in Engineering III (3)

Analytical techniques for solution of boundary-initial problems in engineering involving wave propagation, diffusion processes, and potential distributions. Prerequisite: approval of department.

214 Analytical Methods in Engineering IV (3)

Introduction to variational methods in engineering including Ritz and Galerkin approximation methods for boundary-value problems. Aspects of linear integral equations arising from engineering analysis. Prerequisite: approval of department.

215 Analytical Methods in Engineering V (3)

Advanced methods in solution of boundary-initial value problems in engineering, including characteristics, wave propagation, and Green's functions. Prerequisite: ApSc 213.

216 Special Topics in Engineering Analysis (3)

Selected topics such as (1) perturbation techniques applied to approximate solution of nonlinear boundary and initial value problems in engineering; (2) application of singular integral equations in problems of mechanics; (3) applications of elements of functional analysis in engineering and science. Prerequisite: approval of department.

CIVIL ENGINEERING

168 **Introductory Soil Mechanics** (3)

Engineering properties of soils; analysis of lateral earth pressures, bea capacity, foundations, and slope stability. Prerequisite: CE 120 *Intro tion to the Mechanics of Solids* (3) and ME 126 *Fluid Mechanics* (3).

191 **Metal Structures** (3)

Principles of the design of metal structures; structural elements; con tions; specific problems of analysis; methods of construction. Prere site: CE 123 *Structural Theory* (6).

192 **Reinforced Concrete Structures** (3)

Principles of the design of reinforced concrete structures. Details of r forcement of structural elements. Monolithic structures, precast eleme methods of construction. Prerequisite: CE 123 *Structural Theory* (6).

201 **Design of Metal Structures** (3)

Structural behavior of metal structures, conception and design of vanced structural components and systems, hysteretic behavior, pla design principles, box type girders, cable systems, composite girders, special topics. Prerequisite: CE 191 or equivalent.

202 **Design of Reinforced Concrete Structures** (3)

Structural behavior of reinforced concrete structures, conception a design of structural components, prestressed concrete, slabs, ultim strength and deformation, box type girders, hysteretic behavior, saf considerations, and special topics. Prerequisite: CE 192 or equivalent.

203 **Prestressed Concrete Structures** (3)

Structural behavior and failure modes of prestressed concrete structur design in prestressed concrete, including long-span structures, bridges, a precast systems. Prerequisite: CE 202 or equivalent.

206 **Foundation Engineering** (3)

Principles of soil mechanics and structural mechanics applied to the ana ysis and design of spread footings and mat foundations, pile foundation retaining structures, including sheeting and bracing systems, and wate front structures. Problems associated with subsurface exploration, d watering excavations, and underpinning. Prerequisite: approval of d partment.

253 **Failure and Reliability Analysis of Engineering Structures** (3)

Operational and structural failure mechanisms; instability, fracture, ar fatigue. Operational and structural safety, probability of failure. Aspec of probabilistic structural analysis, statistics of extremes, risk and reliabi ty, optimal design criteria. Prerequisite: ApSc 115 or equivalent.

254 **Special Topics in Structural Engineering** (3)

Selected problems in structural mechanics and design: (1) thermal stress in structural systems, (2) advanced probabilistic structural mechanic (3) structural design for dynamic loads, (4) structural design for repeat loads, or (5) structural synthesis and optimization. May be repeated f credit. Prerequisite: CE 210 *Methods of Structural Analysis* (3), a approval of department. Topic to be announced in the *Schedule Classes*.

255 Coastal Processes (3)

Longshore currents and nearshore circulation; coastal sediment properties and analysis, longshore transport processes and rates; sediment budget; response of beaches to wave action and structures; tidal inlets, mechanical bypassing; beach nourishment; wind transport of sandy dune stabilization, sediment tracing. Prerequisite: approval of department.

258 Harbor and Coastal Engineering II (3)

Interaction between structures and waves. Analysis and design of flexible structures: piers, jetties, and protective structures; off-shore drilling platforms. Design criteria, moorings and cables, harbor operations equipment. Prerequisite: CE 252 *General Structural Dynamics* (3) or equivalent; CE 257 *Harbor and Coastal Engineering I* (3).

261 Analysis of Plates and Shells (3)

Bending and stretching of thin elastic plates under loading with various boundary conditions, continuous plates and plates on elastic foundations, theory of folded plate structures. Theory of curved surfaces; general linear bending theory and its simplification to membrane theory; bending stresses in shells of revolution, shallow shell theory. Specific applications. Prerequisite: graduate status.

263 Theory of Structural Stability (3)

General criteria for stability; buckling of elastic and inelastic columns and frames; torsional and lateral buckling; variational methods. Buckling of plates and shells under static loads; stability of stiffened structures; effect of imperfections and boundary conditions. Prerequisite: graduate status.

271 Theoretical Marine Hydromechanics (3)

Introductory course designed to acquaint the student with some physical concepts and mathematical tools of theoretical marine hydromechanics. Derivation of the fundamental equations and boundary conditions of a fluid media; application of potential-flow theory to fluid motion around two- and three-dimensional bodies; perturbation concepts. Introduction to thin-ship and slender-body theories. Derivation of force and movement of bodies in calm and disturbed water. Prerequisite: approval of department.

274 Mechanics of Water Waves (3)

Irrotational theory for deep- and shallow-water waves, reflexion, refraction, diffraction, attenuation. Water waves of finite amplitude: shallow-water theory, tides, bores, long-waves theory, conoidal and solitary waves. Wave generation by wind, state-of-the-art based on correlation between theory and measurements. Wave-breaking and reflexion. Prerequisite: ME 221 or equivalent and permission of instructor.

275 Special Topics in Ocean Engineering (3)

Selected topics: (1) marine aspects of viscous-flow theory, (2) interfacial (internal) waves, (3) applied random processes in ocean and coastal engineering, or (4) other selected topics. May be repeated for credit. Prerequisite: approval of department.

ER SCIENCE

l Introduction to Computer Systems I (3)

Introduction to programming digital computers in a macro-assembly language and higher-level procedural languages; techniques in machine con-

trol and memory addressing. Characteristics of different computer s tures and the programming of such machines. Introduction to the s ture of compiler languages; parsing of compiler language statem Characteristics and choice of data processing language. Prerequ CSci or EE 51 *Applications of Computers* (3) or equivalent, asse language programming experience, and permission of instructor.

202 **Introduction to Computer Systems II** (3)

Introduction to combinational and sequential logic networks; analysis synthesis of switching circuits using Boolean algebra; minimization niques in the design of logical circuits; number systems and arithmet digital computers, digital computer architecture and the design of f tional sub-units; design of memory, arithmetic, and units comprisi digital computer; information flow, timing, and control in large di computers. Prerequisite: CSci 201 or permission of instructor.

214 **Data Structures** (3)

Computer data structures; arrays, items, pointers, lists, insertion and d tion, available space management, threaded lists, two-way lists, garb collection and compactification. Push-down stacks, strings and files. structures and searching; hash table searches, bubble, radix, and m sorting. Sequential, index-sequential and random files; access meth sorting of files. Subroutines, co-routines, macros, flags, relocation, recursion. Buffer pools and buffer management, data management, storage. List and string processing languages. Prerequisite: CSci *Algorithmic Methods and High-level Languages* (3) or 201; 213 C *puter-aided Analysis and Design of Networks* (3).

219 **Interactive Computer Graphics** (3)

Display devices, CRT, point plotting and vector generation, character f erators; display files, data structures, linear and area transformati clipping and windows; graphic input devices; interrupt handling; scal perspective, projection, hidden line elimination; command langua time-shared interactive graphics, software support. Prerequisite: CSci EE 159 *Programming and Data Structures* (3), or CSci 214; or P mission of instructor.

237 **Computing Systems** (3)

Organization of large digital computer systems. Design of high-spe arithmetic units. Random access and associative memories; rotatio storage devices; computer control and interrupt structures. Input-outp channels and interfacing problems. Communications in digital compute Introduction to multiple access and time-sharing systems. Prerequis CSci or EE 154 *Ditigal Computer Design* (3) or CSci 202.

255 **Formal Languages, Correctness, and Structured Programming** (3)

Introduction to formal computer languages. Structured programmi and block-oriented languages. Regular, context-free, context-sensitive, a unrestricted computer grammars. Parsing a language, syntax of languag pushdown automata and their use in compiling. Top-down structur programming. Avoidance of GO TO statements. Correctness, terminati and equivalence of programs. The inductive assertion method. Termi tion methods based on well-ordered sets. Assertion languages, progra schemes, fixed point methods, and inductive principles. Prerequisite: C 214.

263 **Digital Computer Programming Systems** (3)

Design of computer systems software. Use of a macro-assembler and job control language. Design of assemblers and loaders. Concepts of multiprogrammed job control including linking, loading, linkage-edit, relocatability, and status switching. Design of dispatchers and monitors. Communications between components of an operating system. Input-output programming and control. Design of utility programs. Prerequisite: CSci 214 *Data Structures* (3) or permission of instructor.

ELECTRICAL ENGINEERING

152 **Introduction to Digital Computers** (3)

Introduction to the use of structure of minicomputers and larger computers. Boolean algebra and the design of combinational switching circuits. Number systems, codes, and arithmetic operations in digital computers. Digital computer subsystems and their interconnections. Interfacing equipment to a minicomputer; timing, control, and electronic requirements. Introduction to programming analog computers; analog computer components; analog-to-digital conversion. Prerequisite: EE 157 *Machine and Assembly Language Programming* (3).

153 **Design of Switching Systems** (3)

Switching algebra and Boolean logic; sets, relations, and lattices. Analysis and design of switching devices; design of combinational logic networks. Minimization techniques and decomposition methods. Electronic implementation of logic; contact networks, symmetric functions, and threshold logic. Reliable design and fault-detection tests. Number systems and codes, geometric interpretation, error detecting and correcting codes; encoders and decoders. Logic and electronic design of functional digital units. Sequential circuits and iterative networks. Minimization and transformation of sequential machines; structure of sequential machines; partitions and covers. State identification and fault-detection experiments. Prerequisite: EE 152 or permission of instructor. May be taken for graduate credit.

201 **Natural Modes and Transients in Electrical Systems** (3)

Transient response and natural modes of electrical systems; techniques for analyzing systems with periodic and aperiodic inputs and outputs; sampling.

202 **Linear System Theory I** (3)

Graph theory and its application to networks and systems; system description in time and frequency domain; linear spaces and linear operators; mathematical representation of linear systems; analytical and computer solutions of the state equations; transient and steady-state response. Prerequisite: graduate status.

203 **Linear System Theory II** (3)

System properties; controllability and observability of linear systems; sensitivity and stability analyses. Irreducible realizations of rational transfer-function matrices; canonical forms, state feedback, and state estimators. Linear composite systems. Prerequisite: EE 202.

204 **Stochastic Signals and Noise** (3)

Probability, random variables, characteristic functions; transformations of random variables and applications; sequences of random variables, linear

mean-squared estimation; stationary estimation, stationary random p
esses, correlation functions, power spectrum; output of linear systems
stochastic inputs; Gaussian processes. Applications drawn for commun
tions, control theory, computer science.

224 **Electronics of Lasers** (3)

(Formerly Quantum Electronics of Masers and Lasers)

Basic concepts from quantum mechanics; Einstein coefficients; invers
and pumping mechanisms; rate equations. Resonators, He-Ne laser;
ganic dye lasers; injection lasers. Nonlinear interactions in lasers.
requisite: EE 222 *Physical Electronics II* (3) or equivalent.

241 **Information Theory** (3)

Measure of information, noiseless coding; communication channels, ch
nel capacity, the noisy channel coding theorem; bounds on the perfor
ance of communication system; the Gaussian and binary symmetric cha
nel; feedback communications systems; rate-distortion theory. Prereq
site: EE 204.

242 **Coding Theory** (3)

The PCM Communication System, mathematics of coding; groups, rin
and fields, linear codes: parity and generator matrices, syndromes er
correction and deletion capability, minimum distance; performance boun
of linear codes, Hamming and Golay codes, polynomial algebras and Gal
fields, shift-register implementation, cyclic codes: implementation and pe
formance, BCH codes: encoding, decoding, minimum distance, the BCH d
coding algorithm, burst-correction codes, convolutional codes, sequenti
and Viterbi decoding of convolutional codes.

243 **Communication Theory I** (3)

Optimum receivers for vector channels and for the additive white Gau
sian noise channel; correlation detectors, matched filters; coherent and no
coherent detection and their error probabilities for simplex, orthogonal, a
coded systems; bounds on the performance of communications in Gaussia
noise; comparison of communications systems. Prerequisite: EE 204
equivalent.

244 **Communication Theory II** (3)

Schemes for efficient signalling for data sequences; effects of quantizing
the receiver. Practical implementation of orthogonal and simplex code
communication. Convolutional codes; bounds on performance decoding b
sequential (Zigangirov-Jelinek, Fano) and MAP (Viterbi) algorithm
Fading and dispersive channels, diversity techniques and their performanc
Topics from analog communications. Prerequisite: EE 243.

245 **Signal Detection and Estimation Theory** (3)

Statistical detection theory, hypothesis testing, sequential detection, estima
tion theory, maximum likelihood and Bayes methods, estimation of signa
parameters and continuous wave forms, Wiener and Kalman filters, appl
cations to the design of optimum receivers, adaptive systems. Prerequ
site: EE 241, 244; or equivalent.

*250 **Telecommunication Systems Concepts** (3)

Essential elements of an electrical communication system, speech, T
and data signals, spectrum, bandwidth, sampling. Amplitude, frequen
and pulse code modulation and comparative performance. Multiplexi

schemes, communication quality standards and objectives. Signal power, noise power, distortion, and channel capacity. Probability, traffic theory, reliability, voice, TV, and data transmission. Telecommunication, microwave radio, cable, and satellite communications systems.

*251 **Survey of Telecommunication Systems** (3)

Design of a communications link for voice, TV, and data. Loading; the switched telephone network. Transmission system layout and major design considerations. Overall system design of microwave radio system. Radiowave propagation fundamentals. Satellite communications, factors affecting the choice of orbit and orbital separation of satellites, satellite transponder. Major design consideration and values of significant parameters for a typical satellite communications link. Overall design of a cable communication system. Digital transmission and digital terminals. Wideband data transmission. Frequency allocation.

298 **Research** (arr.)

Research as arranged. May be repeated for credit.

300 **Thesis Research** (3–3)

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

*250 and 251 cannot be applied toward a graduate degree in the School of Engineering and Science.



...house Defense and Electronic Systems Center, Baltimore Washington International Airport—Electrical Engineering and Computer Science graduate programs are offered at this location by GW's School of Engineering and Applied

ENGINEERING ADMINISTRATION

150 Introduction to Engineering Administration (3)

The interrelationships of engineering, science, and management; co tual foundations for interaction of human factors in individuals, gr and the social environment of engineering activities. Familiarization typical activities of engineering managers, and with factors bearing o motivation of engineers and on engineers as managers. Social an ganizational factors relevant to the management of engineers. This c is preliminary to the complete management process studied in EAd 21

160 Introduction to Engineering Economic Analysis (3)

Economic decisions, equivalence, mathematics of finance, present w annual cost or profit, internal rate of return, benefit/cost ratio, incre tal analysis, multiple alternatives, economic decisions under risk, infla depreciation methods, balance sheets, profit and loss statements, the countant's view, and before and after tax analysis.

170 Basic Quantitative Methods for Engineering Administration (3)

An introductory treatment of quantitative tools and techniques impor in engineering administration. Concepts of probability, statistics, operations research.

204 Administration of Engineering Contracts (3)

Study of the total contracting process, including initial budget prep tion and justification, actions leading to the execution of a contract, administration of the contract to completion considered from the vi points of the industrial and government buyer and the seller of techn materials and services.

207 The Personnel Function for Engineering Administrators (3)

Principles of managing human talent, the most vital resource in engin ing or research; emphasis on principles, theory, and practical conside tions of the personnel function for engineering managers, with pract applications in an engineering administration environment.

210 Engineering Law (3)

Legal principles and procedures of interest to engineers. The Ameri legal system, contracts and specifications, liability of professional gineers, product liability, agency relationships, patent and propriet rights, special problems in research and developmental contracts.

211–12 Engineering Administration (3–3)

Comprehensive and systematic study of the administrative process; ind trial, scientific, and engineering environments. Planning: objectives, F diction, policies, and characteristics of plans. Organizing: theory of ganization, structure, authority, specialization, delegation, staff, and cc mittees. Directing: leadership, managing human and material resour Controlling: setting standards, evaluating performance, using system fe back data for correction and improvement. Students who receive cr for EAd 211–12 cannot receive credit for EAd 201 *Management Scientists and Engineers* (3). Prerequisite: EAd 150, EAd 160, or eq alent.

221–22 Environmental Management (3–3)

The spectrum of technical, economic, political, administrative, and so forces influencing the quality of our environment. Review of gov

mental and industrial programs to combat pollution of the air and water, and to control pesticides, noise, and radiation. Historical development of legislation dealing with environmental science and management. Review pending legislation involving environmental and energy matters; theoretical aspects of specific management problems.

231 Program Management (3)

Programs and projects are widely used in industry and government to facilitate the management of technical undertakings. Management science, the systems approach, and traditional managerial concepts are applied to a variety of typical cases.

241 Construction Management I (3)

Contract negotiations; aspects of contracts and specifications important to management. Construction estimating and cost allocation in heavy and building construction; budgeting and accounting concepts.

242 Construction Management II (3)

Construction administration: organization, construction planning, and scheduling. Industrial relations and human factors in construction management, work measurement, programming and progressing, project management and control.

254 Automatic Data Processing Systems (3)

Logic of computers, hardware and software, systems analysis for data processing applications, systems design, systems economics. Impact on decision-making, business, and society.

255 Administration of Research and Development (3)

The study of technological innovation as a vital part of the acquisition process; the role of the technical administrator in utilizing organization, plans, and control to accomplish research and development objectives.

261 Economic Analysis in Engineering Planning (3)

Case studies in engineering economic planning, advanced problems in engineering economy. Prerequisite: EAd 160 or equivalent, course in engineering economy and permission of instructor.

269 Elements of Decision-Making and Problem-Solving (3)

Concepts and quantitative techniques of scientific method in solving administrative problems. Role of decision criteria and other subjective factors. Managerial economics. Model building, testing, solving. Replacement under certainty or risk. Control-general, control charts, sampling inspection. Experimentation to differentiate variables, build models-canons of induction, statistical tests, analysis of variance, linear regression. Application to nonmathematical formulations.

81 Systems Analysis and Management I (3)

The systems or holistic approach as a methodology for making decisions and allocating resources. Analysis by means of objectives, alternatives, models, criteria, and feedback. (Fall)

82 Systems Analysis and Management II (3)

Extension and elaboration of systems analysis techniques, including their application to industry, input-output structures, human behavior in organizations, and military situations. Prerequisite: EAd 281.

297 **Problems in Engineering Administration** (3)

Project course providing the student with the opportunity to apply the ious concepts and tools previously studied to the solution of a proble engineering administration. Students work individually or in small gr each on a problem proposed by the student and approved by the instru Open to Master's degree students only. Departmental.

ENGINEERING SCIENCE

203–4 **Probability and Statistics of Metrology** (3–3)

Probability distributions, discrete and continuous distributions; sampl combinatorial analysis; stochastic processes; conditional probability; relation; analysis of variance; design and analysis of experiments; L Square experiments; factorial experiments; block and lattice design. requisite: ApSc 115 or equivalent.

221 **Theory of Elasticity I** (3)

Introduction to Cartesian tensor analysis; deformation, stress, linear stitutive relations, formulation of boundary value problems, variatio principles; torsion and bending of prismatical rods, plane problems elastostatics. Prerequisite: approval of department.

229 **Transformations in Materials** (3)

Thermodynamics of solids, statistical interpretation of entropy, lattice fects, equilibrium in multicomponent systems, rate theory, diffusion, ph transformations, nucleation and growth, precipitation, martensitic tra formations. Prerequisite: approval of department.

231 **Structure of Materials** (3)

Space lattices, crystal structures, planes, directions, anisotropy, texture preferred orientations, stereographic projections, Bragg's law, Laue te niques, moving crystal diffraction, Debye-Scherrer method, x-ray sp trometry, electron microscopy, bonding energy of crystals, lattice ener lattice vibrations, free electron theory, zone theory, alloy theories, c ductors, insulators and semiconductors, magnetism, resistivity, defects metals. Prerequisite: approval of department.

234 **Composite Materials** (3)

Principles of composites and composite reinforcement; micromechani and failure; interface reactions in various composites; reinforcing ma rials; structure of composites—fiber-reinforced polymers, filler-reinforc polymers, fiber-reinforced metals, directionally solidified alloys, dispersio strengthened metals. Prerequisite: approval of department.

239 **Physical Ceramics** (3)

Crystal chemistry and the systematic study of the structure of ceram materials; solid reactions occurring at elevated temperatures: sinteri vitrification, diffusional mechanisms and effects; reaction rate theory; el tic, anelastic, and plastic properties of ionic and covalent solids, visc elastic behavior of vitreous and vitreous-solid systems; phase equilibria ceramic systems. Prerequisite: approval of department.

240 **Fracture Mechanics** (3)

Fundamentals of brittle fracture, Griffith theory and extensions, mechan of fracture, linear elastic systems, plasticity considerations, fracture tou

ness, engineering analysis, notch strength analysis with limit approach, crack propagation laws, fatigue, fracture testing, comparison of recent continuum theories. Prerequisite: EngS 221 or CE 261.

263 Atmospheric Physics for Engineers I (3)

Atmospheric radiation: phenomenological equation of transfer; solutions to the transfer equation; optical, physical, and chemical properties of atmospheric constituents; remote sensing and the direct inversion problem; energy transfer and atmospheric structure. Prerequisite: approval of department.

264 Atmospheric Physics for Engineers II (3)

Atmospheric dynamics: mean structure of the atmosphere, temperature, pressure, and wind fields; mass, momentum, and energy transfer; large-scale features of atmospheric circulation; regional features of atmospheric circulation; micrometerology. Prerequisite: approval of department.

270 Theoretical Acoustics I (3)

Basic acoustic theory in stationary and uniformly moving media; waves in infinite space; sound transmission through interfaces between layered media and between media in relative motion; sound radiation from simple solid boundaries, source and dipole fields; propagation inducts and enclosures; elements of classical absorption of sound. Prerequisite: ME 221, ApSc 213 or equivalent.

271 Random Process Theory I (3)

Random processes; stationarity and ergodicity; mean-square calculus; auto- and cross-correlations and spectra; random processes in linear systems; mean-square estimation, prediction and filtering; zero and level crossings and peak distributions; applications in aerospace sciences. Prerequisite: EngS 203 or approval of department.

272 Random Process Theory II (3)

Discrete and continuous state Markov-processes: chains, queues, diffusion, and passage problems; linear and nonlinear estimation and stochastic control; estimation of correlations and power spectra; applications in communication theory; scattering from random surfaces; stochastic linearization and stability. Prerequisite: EngS 271.

273 Time Series Analysis (3)

Harmonic analysis of deterministic and random signals; auto- and cross-correlations and spectra; periodogram, Blackman-Tukey and direct filtering methods of spectral estimation; effects of finite length and digitization; variability; coherence. Fast Fourier transform techniques; applications in modern technology. Prerequisite: EngS 271 or approval of department.

274 Environmental Noise Control (3)

(Formerly Noise and Vibration Control)

Introduction to the physical effects of noise and vibration on man, practical sources of noise and their control; building noise, ventilation system noise, mechanical equipment noise, aircraft noise; automobile and truck noise; factors affecting vibration levels and vibration control by structural design, damping, and isolation. Prerequisite: EngS 270, ME 215.

275 Theoretical Acoustics II (3)

General theory of sound propagation in homogeneous media, viscous and heat conduction effects; methods of solving the inhomogeneous wave

equation; theory of sound radiation, sources, dipoles, quadrupoles; ation from moving sources; scattering and diffraction of sound by stacles; introduction to acoustics of inhomogeneous media, geom acoustics. Prerequisite: EngS 270.

276 **Acoustical and Mechanical Measurements** (3)

Characteristics of signals, basic transducer elements, standards of mea ments and calibrations, signal recording and processing, acoustical vibration instrumentation, vibration exciters, vibration testing techni flow mechanical measurements. Prerequisite: EngS 270, ME 215.

277 **Physical Acoustics** (3)

Concepts of continuum mechanics and thermodynamics, wave prop tion in real media, thermal viscous and relaxational attenuations, pi electric crystals and ultrasonics, wave propagation in rigid and defo able porous media. Prerequisite: EngS 275.

278 **Psychological and Physiological Acoustics** (3)

Auditory system and its response to sound, experimental methodolog psychoacoustics, subjective response to sound, environmental noise its evaluation, criteria for the prediction of noise nuisance, nonaudi system response to noise. Prerequisite: approval of department.

279 **Human Factors in Engineering** (3)

Man-machine interface, effects of physical stress on human behavior performance, life support system, learning and conditioning of phys stress.

280 **Special Topics in Acoustics** (3)

Current methods and problems in acoustics. Topics chosen from s areas as aerospace noise generation and control; instruments and pro dures for acoustics measurements; and responses of structures, people, communities to noise. Prerequisite: approval of department.

284 **Numerical Methods in Engineering** (3)

The uses of computers in engineering and science; numerical interpo tion, integration and differentiation; least squares approximations a application to data fitting; roots of polynomials; eigenvalue and eig vector problems; solution of systems of linear equations; ordinary d ferential equations; introduction to solution of partial differential equ tions; applications to initial and two-point boundary value problems engineering mechanics and other areas of engineering. Prerequisite: proval of department.

285 **Finite Element Methods in Engineering Mechanics** (3)

Formulation of the finite element method through the use of variatio principles for structural and continuum mechanics problems. Plane stre plane strain, three-dimensional elasticity, plate bending, thermal cond tion, and potential flow. Techniques of constructing and assembl characteristic elemental matrices, computer implementation of the fi element method. Prerequisite: approval of department.

286 **Analysis and Design of Thin-walled Structures** (3)

Statics of thin-walled beams and panels, force interplay between stiff ers and skin in the analysis and design of stiffened thin-walled structu strength and stiffness of locally buckled stiffened structures; classifica of loads and safety factors; different considerations governing the des

of thin-walled structures; critical evaluation of various structural design procedures. Prerequisite: approval of department.

287 **Automated Design of Complex Structures** (3)

Review of techniques for automated design including mathematical programming, fully stressed design, and optimality criteria; application of automated design techniques to stiffened and composite shell-type structures; multiple-load conditions and design constraints. Prerequisite: approval of department.

289 **Special Topics in Theoretical and Applied Mechanics** (3)

Prerequisite: approval of department.

298 **Research** (arr.)

Basic research projects as arranged. May be repeated for credit.

-300 **Thesis Research** (3–3)

310 **Aeroacoustics** (3)

General theory of aerodynamic sound generation and propagation. Lighthill's formulation of jet noise, similarity laws, supersonic and subsonic jet noise, boundary layer noise, fan and compressor noise, helicopter noise, sonic booms. Current problems in aeroacoustics. Prerequisite: EngS 275.

311 **Nonlinear Acoustics** (3)

Finite amplitude waves and waves in moving stratified media. Interaction between linear and nonlinear waves, wave propagation through nonlinear media, applications to transmission of sound through ducts with flow and absorbing walls. Prerequisite: approval of department.

312 **Theory of Random Vibration** (3)

Response of linear systems to stationary random inputs. Failures resulting from dynamic response. Response of space vehicle structures to intense noise fields, measurement, and application. Prerequisite: EngS 271, ME 215.

313 **Structural Acoustic Interaction** (3)

Coupled response of structures to sound, system of infinite extent, system of finite extent, sound radiation from structure, sound transmission through structure. Panel response to turbulent boundary-layer excitation. Sound radiation from mechanically excited structure vibration. Prerequisite: EngS 270, 312.

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying examination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

NICAL ENGINEERING

5 **Theory of Vibrations** (3)

Damped and undamped natural vibrations, transient response and response to harmonic and periodic excitation, natural vibration of discrete and continuous systems; integral formulation of eigenvalue problems, response

by modal analysis, approximate methods, influence of secondary effe
and constraints, damped systems. Prerequisite: approval of departme

216 **Structural Dynamics** (3)
Methods of solving vibration problems: differential equation, Raylei
Ritz finite element. Free and forced vibration of structural componen
straight, curved, and thin-walled beams; plates and shells; sandwich c
struction. Vibration of built-up structures. Structural wave motion, w
motion in periodic structures. Prerequisite: ME 215.

221 **Intermediate Fluid Mechanics** (3)
The continuum, kinematics of fluids; stress tensor, strain and rate-of-str
tensor; fundamental equations of the flow of viscous compressible flui
Laplace's equations; source, sink, and doublet; vortices, Biot-Savart th
rem and the flow field of a vortex; spherical and cylindrical harmoni
methods of singularity distributions, complex-variable methods; lamir
flow of viscous incompressible fluids; boundary-layer concept. Prereq
site: approval of department.

222 **Applied Fluid Dynamics** (3)
Subsonic lifting line wing theory, direct and inverse solution of the lift
surface theory; singularity method for wing-body combination; vortex
theory; effects of camber and twist distribution; transonic airfoils, eff
of wing sweep, area ruling concept; supersonic linearized wing theo
similarity rules. Prerequisite: ME 221 or equivalent.

227 **Viscous Flow** (3)
Exact solution of Navier-Stokes equations; the small Reynolds numl
approximations, laminar boundary-layer theory and the techniques for
solution, stability of laminar flows; Reynolds theory of turbulent stress
applications to internal and external flows, turbulent boundary-layer t
ory; applications to heat-transfer problems; flow separation. Prerequisi
ApSc 213; ME 221 or equivalent.

235 **Compressible Flow** (3)
Thermodynamics and physical properties of gases, fundamental equatio
of a compressible inviscid fluid, small perturbation theory, expansions
Mach number and thickness parameters, second-order shock shapes, r
of entropy in supersonic flow, shock wave interactions, holograph tra
formation, Kármán Tsien and other model gases, conical flows, transo
flow theory, method of characteristics, rotational nonisentropic flows. P
requisite: ApSc 213; ME 221 or equivalent.

237 **Energetics of Fluid Flow I** (3)
Energy transformations in fluid flows. Gasdynamics of combustion. N
uniform flow, mixing. Mechanisms of flow induction. Applications
pumping, propulsion in water, air, and space, and thrust augmentati
Prerequisite: approval of department.

238 **Energetics of Fluid Flow II** (3)
Wave processes and their utilization. Static, dynamic, and cryptoste
pressure exchange; energy equalizers and dividers. Advanced concept
air and marine propulsion. Topics for discussion will include a variet
flow induction, thrust generation, and environmental control conce
Prerequisites: ME 237 or equivalent.

48 Seminar: Aircraft Design I (3)

Designing an aircraft to specifications. Regulatory requirements, state-of-the-art limitations, computer-aided design, integration of aircraft components, economic considerations, and iterations to final configuration to obtain specified mission profile. Prerequisite: approval of department.

70 Aerodynamics of Flight Vehicles (3)

Aerodynamic loads on flight vehicles, interference effects, application of aerodynamic theory to aircraft design, studies of aircraft dynamics and performance. Prerequisite: ME 222 or equivalent.

71 VTOL Aircraft Technology (3)

Fundamental principles of VTOL aircraft; hovering performance based on momentum theory; analysis of jet-induced interference effects; transition aerodynamics; theoretical stability and control and correlation with flight data; ground-effect theory and experiment; handling qualities criteria; elements of instrument approach and landing problem. Prerequisite: approval of department.

73 Principles of Automatic Flight Control (3)

Design of aeronautical instrumentation and feedback controls; mathematical models of sensors, controllers, and actuators; theory of feedback control, stability, accuracy, and speed of response; equalization effects of nonlinearities and noise. Prerequisite: approval of department.

74 Principles of Flight Guidance (3)

Guidance requirements for atmospheric flight; implementation of guidance systems using inertial and radio techniques in conjunction with automatic data processing. Prerequisite: ME 273.

75 Stability and Control of Vehicles (3)

Derivation of equations of motion, Euler transformations and direction cosines, stability derivatives and linearization of equations of motion, stability of linear systems with application to longitudinal and lateral dynamics, Laplace transform techniques and frequency response analysis. Prerequisite: approval of department.

76 Mechanics of Space Flight (3)

First- and second-order Hamilton-Jacobi perturbation theory applied to artificial satellites, von Zeipel's methods, special and general perturbation theories for third-body perturbations. Differential correction of orbits by weighted least squares and minimum variance techniques. Comparison of various filtering techniques as applied to orbit determination and other space flight parameter estimation. Prerequisite: approval of department.

79 Special Topics in Flight Sciences (3)

Current problems and methods in high angle of attack stability and control. Nonlinear aerodynamics in the angle of attack region above the stall. Influence of aircraft design and nonlinear aerodynamic parameters on the poststall stability and control of aircraft. Employment of current experimental techniques and development of equations pertaining to developed spin and recovery characteristics. Prerequisite: ME 275 or approval of department.

80 Intermediate Thermodynamics (3)

Thermodynamic systems; Gibbs equation; potentials, thermodynamic relationships, equilibrium and stability. Statistical thermodynamics; probability

and macrostates; properties of perfect gases, mixtures and cry
Elements of kinetic theory and its application to transport prope
Introduction to relativistic thermodynamics. Application to chemical
tions, thermal radiation, magnetic, electric and solid systems. Prerequ
approval of department.

281 **Nonequilibrium Thermodynamics** (3)

Molecular theories of gases; thermodynamic properties and Boltzmann
tegro-differential equation, the H-theorem and entrophy; equations of
and potentials; the equation of change and velocity distribution ou
equilibrium; transport properties. Field theory. Constitutive, balance,
Gibbs equations. Variational principles. Application to transport proc
in engineering systems. Prerequisite: ME 280.

290 **Kinetic Theory of Gases** (3)

Equation of state and physical properties for gas composed of disc
particles; relation of kinetic theory to thermodynamics; Maxwell distr
tion of molecular velocities; Boltzmann H theorem. Molecular inte
tions, free paths, collision rates, scattering coefficients. Introductio
diffusion, viscosity, heat conduction; imperfect gases; flow of gase
low density. Prerequisite: ME 280.

297 **Special Topics in Fluid Mechanics** (3)

Prerequisite: approval of department.

298 **Research** (arr.)

Research as arranged. May be repeated for credit.

299–300 **Thesis Research** (3–3)

398 **Advanced Reading and Research** (arr.)

Limited to students preparing for the Doctor of Science qualifying ex
ination. May be repeated for credit.

399 **Dissertation Research** (arr.)

Limited to Doctor of Science candidates. May be repeated for credit.

English

Chairman: J.P. Reesing, Jr., Professor of English; Stuart 407, Telephone 676-618

Before students are registered in Engl 10, they are tested in the minimum essent
of vocabulary, spelling, grammar, standard usage, and writing skill. Those stude
who show marked superiority may be exempted from one or both halves of
English Composition course; those who are inadequately prepared for Engl 10 will
given permission to register for Engl 9 on campus. Engl 9 or 10 is prerequisite to
other courses in English.

ENGLISH AS A FOREIGN LANGUAGE

20 **Intensive Basic English**

Meets 20 hours per week. The objectives of the course are to strengt
the ability to use basic grammatical structures appropriately and
introduce increasingly complex structures: to build reading skills anc
enlarge vocabulary through the use of specially adapted materials
introduce the student to unadapted reading materials, such as n

papers; to focus on writing sentences in order to familiarize the student with the cultures of the English-speaking peoples; and to foster multicultural sharing among international students.

30 Intensive Lower-Intermediate English

Meets 20 hours per week. The objectives of the course are to increase the ability to use complex grammatical structures; to develop writing ability through the paragraph level and to improve reading skills; to enlarge vocabulary further and to encourage oral expression through practical conversation and laboratory exercises.

40 Intensive Higher-Intermediate English

Meets 20 hours per week. The objectives of the course are to provide a comprehensive review of grammatical structure, including the clause level; to enlarge vocabulary further through use of unadapted reading material; to increase reading speed and comprehension; to encourage oral expression of ideas encountered in the student's reading material. The course also includes instruction in composition which focuses on outlining and techniques of exposition.

45 Semi-Intensive Higher-Intermediate English

Meets 15 hours per week. The objectives of the course are the same as for EFL 40. Students enrolled in EFL 45 may—with the authorization of the Admissions office of the school to which they are applying—take one undergraduate or graduate course concurrently with English.

50 Advanced English

Meets 4 hours per week. An advanced-level composition course for students showing a high level of academic proficiency in English. The aim of the course is to develop writing skills and to foster an understanding of technical writing. The course requires a writing assignment each week and a 10- to 20-page research paper. For the latter project, the student is introduced to library research methods. The course meets 4 class hours per week and also involves extensive individual counseling outside the classroom. Students completing this course with a passing grade may enroll in English 11 or 12, the regular second-semester freshman composition courses. Three semester hours of academic credit.

ISH COMPOSITION

9 English Composition: Language as Communication (3) (Campus Course)

Intensive grammar and composition course for students inadequately prepared for Engl 10. Detailed instruction, drill, and exercises in basic structure and writing paragraphs; also includes content covered in Engl 10. In addition, a noncredit reading course, given by the Reading Center, is required for students whose test scores show a reading deficiency. Engl 9 meets five hours per week and carries three semesters hours of credit; the reading course meets an additional three hours per week for a maximum of 10 weeks. Fees: tuition, $315; special fee, $25.

10 English Composition: Language as Communication (3)

Study and practice of expository techniques; emphasis on the rhetorical complexities of unity, development, organization, and coherence, by analysis of selected current prose; library research procedure.

11 English Composition: Language and the Arts and Sciences (3)

Study and practice of expository and argumentative techniques; emph on the rhetorical complexities of the sentence and diction, and on log thought, by analysis of selected readings on the nature of language an the arts and sciences. Prerequisite: Engl 9 or 10.

20 The Writing of Reports (3)

Theory and practice in the writing of technical reports. Prerequis Engl 9 or 10 and 11.

HUMANITIES

43–44 Classical Humanities (3–3)

Interdisciplinary study of the origins of Western thought. Reading intensive class discussion of selections from the Bible and of five works e semester from the following authors: Homer, Hesiod, Aristophanes, Pla Aristotle, Aeschylus, Euripides, Sophocles, Herodotus, Thucydides, Luc tius, Marcus Aurelius, Epictetus, Polybius, St. Augustine. Background tures on the major intellectual, artistic, economic, and social movements.

45–46 Humanities in the Modern World (3–3)

Interdisciplinary study of modern Western thought from the Renaissa to the 20th century. Reading and intensive class discussion of five wo each semester from the following authors: Machiavelli, Pope, Voltai Rousseau, Goethe, Tolstoy, J.S. Mill, Zola, Nietzsche, Kierkegaard, Fre Kafka, Koestler, T.S. Eliot. Background lectures on the major intell tual, artistic, economic, and social movements.

ENGLISH LITERATURE

51–52 Introduction to English Literature (3–3)

Representative works by major authors studied in their historical conte discussion of recurrent themes, and introduction to various types a forms of imaginative literature.

AMERICAN LITERATURE

71–72 Introduction to American Literature (3–3)

Historical survey. Engl 71: From beginnings to the Civil War. En 72: From the Civil War to present.

175 Special Topics in American Literature (3)

Environmental Health*

For further information call David A. Rowley, Assistant Dean, Graduate School Arts and Sciences, Telephone 676-6210

201 Introduction to Epidemiology and Environmental Health (3)

Open to qualified graduate students. Principles and methodology of demiology and biostatistics. Ecological approach to health and dise including parasitology and mycology.

* These courses are included in certain interdepartmental programs of the Master of Arts/M of Science in Special Studies degree which is under the academic jurisdiction of the Grad School of Arts and Sciences.

231 **Venereal Disease in the Community** (3)

A survey course to develop an understanding of venereal disease problems. Etiology, clinical manifestations, diagnosis, prevention, and control. For parents, school teachers, health personnel, and other educators.

240 **Environmental Impact Statement Procedures and Environmental Law** (3)

The rationale for environmental impact statements from the viewpoint of the nature and origins of the environmental crisis. Government agencies responsible for environmental impact statements, current statutes and regulations pertaining to the environment.

254 **Human Ecology** (3)

Ecology—man within the framework of reference—physical and cultural anthropology, geography, sociology, urban planning, public health, and public administration.

256 **Introduction to Environmental Health** (3)

Organizations, functions, current practices, and regulations at all levels to control the environment. Economic impact upon society and industry in carrying out control and preventive practices.

270 **Industrial Hygiene** (3)

Industrial health hazards: chemical exposure to toxic dusts, metallic fumes and vapors, gases, and organic compounds; physical hazards such as high and low temperature biological effects, radiation (electromagnetic, ultraviolet, ionizing), illumination, sound, pressure, and particulate pollution; prevention and control of industrial health hazards.

293 **Public Health and School Health Methods and Activities** (3)

Relationship between public health and school health. The purpose of the course is to aid the teacher in presenting information in the classroom setting.

301 **Applied Epidemiology and Environmental Health** (3)

Lectures, seminars, and case studies. Epidemiological solutions to health problems of the community.

sic Sciences

m: C.E. O'Rear, Professor of Forensic Sciences, Samson Hall, Telephone 7 or 676-7319

01 **Forensic Serology** (3)

Fundamental analysis of blood and other biological materials. Specific procedures and techniques used in forensic serology—from presumptive tests to blood enzyme classifications.

02 **Instrumental Analysis** (3)

Principles and application of various instrumental methods to the examination of criminal evidence, including chromatographic and spectrophometric techniques and mass spectrometry.

203 Examination of Questioned Documents (3)

Theory and principles of handwriting and handprinting, duplica processes, paper manufacture and fiber analysis; studies of paper methods of examining questioned documents.

204 Firearms and Tool-mark Identification (3)

Methods for identifying firearms, cartridge casings, tool-marks, marks, and footprints.

214 Forensic Psychiatry (3)

Introduction to the constructs of dynamic psychiatry, psychiatric tre ment, and the nomenclature of mental disorders. Consideration of pert testimony, direct examination, and cross-examination in hospitali tion and criminal cases.

220 Introduction to Forensic Science (3)

Survey of the forensic physical sciences; qualifications and preparati of expert witnesses and their court roles in criminal and civil cas operation and functioning of the forensic laboratory.

224 Introduction to Criminal Law (3)

(Formerly Introduction to Criminal Law, Procedure, Evidence, and Leg Methods)

Principles of criminal law and procedure, preparation and presentatic of evidence, examination of witnesses, and methods of legal research.

225 Advanced Criminal Evidence (3)

Procedural rules affecting the collection and use of physical evidenc Emphasis on court opinions defining the rules of search and seizure an admissibility of evidence. Prerequisite: ForS 224.

227 Advanced Criminal Procedure (3)

Decision to arrest, prosecutive discretion, bail, the preliminary hearin right to a speedy trial, discovery, plea bargaining, publicity, post-convic tion procedures. Prerequisite: ForS 224.

228 Administration of Criminal Justice (3)

Consideration and analysis of selected advanced problems in the adminis tration of criminal justice. Emphasis on the role and professional respon sibilities of prosecutor and defense counsel and on developmental trend in the law. Prerequisite: ForS 224.

251 Moot Court (3)

Students will prepare and present direct testimony and be cross examine by an experienced trial attorney in simulated courtroom setting. Class dis cussions of problems, techniques. Lectures on discovery, admissibility o scientific evidence, chain of custody, use of notes.

254 Selected Topics in the Forensic Sciences (3)

Current issues in research, investigation, and law.

260 Introduction to Forensic Medicine (3)

Anatomy and physiology of the human body with emphasis on unde standing the processes underlying traumatic and unexpected deaths

countered in forensic pathology. Bone growth and repair as it relates to child abuse, structure and functions of the heart relating to sudden death, and anatomic area of the brain prone to hemorrhagic lesions following trauma.

261 Introduction to Forensic Pathology (3)

Terminology and scientific techniques used in medico-legal investigations, sudden or unexpected deaths, homicides, suicides, accidental deaths, and trauma.

265 The Illicit Use of Drugs (3)

Chemical, pharmacological, toxicological, and pathological characteristics of commonly abused drugs, including ethanol, barbiturates, narcotics, stimulants, and hallucinogens. Primarily for M.A. in Sp.Std. degree candidates; open to others with permission of instructor.

266 Seminar: Modern Trends in Criminal Justice (3)

Recent advances in criminal justice. Discussions incorporate several disciplines including science, law, management, social sciences, and psychology.

269 Forensic Toxicology (3)

Relevant underlying biological, chemical, and pharmacological principles of forensic toxicology.

295 Research (arr.)

Open to qualified master's degree students. Research on problems approved by the department chairman or academic advisor, under the supervision of an appropriate staff member. Laboratory exercises in those methods in principal use in crime laboratories.

300 Thesis Research (3–3)

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an: G.E. Mazzeo, Professor of Romance Languages; Monroe 429, Telephone 30

ement Examination: A student who has not been granted advanced standing o wishes to continue in college the language begun in high school must take ment examination before registration. Upon completion of the examination, ent is made to the appropriate course.

1–2 First-year French (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Fren 2. For beginners. Pronunciation, conversation, grammar, composition, readings. Oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 Second-year French (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Fren 4. Conversation, grammar review, composition, reading in modern

ered by the Department of Romance Languages and Literatures.

French prose. Oral practice in language laboratory. Prerequisite: F
1–2. Laboratory fee, $17.50 a semester.

Geodesy*

Program Advisor: Hyman Orlin, Professorial Lecturer in Cartography, Geodesy, &
Oceanography, Building F, Telephone 676-7000 or 946-3557

12 Plane Surveying (3)

Basic plane surveying for cartographers and surveyors. Field exerci
as arranged. Prerequisite: Math 30 or equivalent mathematical exp
ience.

13 Higher Surveying (3)

Elements of geodetic and hydrographic surveying for cartographers a
surveyors. Field exercises as arranged. Prerequisite: Geod 12 and Math 3

17 Elementary Photogrammetry (3)

Fundamentals of aerial photography, photogrammetric optics, and phot
graphic processes; mathematics of vertical and tilted photographs; ste
eoscopy and parallax; planning and executing the photogrammetric pro
ect; radial triangulation methods; photomaps; oblique and terrestri
photography. Recommended prerequisite: Geod 12, Math 30.

18 Intermediate Photogrammetry (3)

Basic theory and practices. Stereoscopic plotting instruments; graphic
and computational methods for adjusting strips of aerotriangulation
Method of least squares, statistics and transformations applied to photo
grammetry. Prerequisite: Geod 17.

106 Physical Science Data Analysis (3)

Elementary analysis of cartographic, geodetic, and oceanographic data
Basic concepts of probability, sample statistics, probability distributions
confidence intervals, estimation and tests of hypotheses as related to carto
graphic, geodetic, and oceanographic data. Prerequisite: Math 30, and
either Cart 1–2 or Geod 150–151.

110 Map Projections (3)

Elementary theory of projections in cartography and geodesy. Projection
of the sphere and ellipsoid on plane, conical and cylindrical surfaces
Prerequisite: Math 33.

117 Analytic Photogrammetry (3)

Analytic photogrammetry theory and practice: matrix algebra, method
of least squares, image coordinate refinement, formulation for analyti
photogrammetry, intersection, linearization of equations, space resection
two- and three-photo relative orientation, strip adjustment review, bloc
adjustment. Prerequisite: Math 32, Geod 18.

119 Advanced Mathematical Photogrammetry (3)

Mathematical treatment of resection, intersection, relative orientation
error propagation, adjustment and coordinate transformation using matri

* Affiliated with the Department of Geography and Regional Science.

algebra. Derivation of colinearity equations and image coordinate corrections for frame, panoramic and strip photography. Prerequiste: Geod 17, Math 124 or equivalent experience.

150 Geometric Geodesy (3)

Principles and formulas basic to theoretical and applied geodesy. Primary emphasis on geometric methods. Prerequisite: Math 33.

151 Physical Geodesy (3)

Physical and celestial methods and application of geodesy. Prerequisite: Phys 1 or 3, Math 33.

156 Geodetic Astronomy (3)

Astronomic determination of longitude, time, azimuth, and latitude. Prerequisite: Math 32, Geod 155 or comparable experience.

158 Electronic Surveying and Navigation (3)

An examination of the principles and applications of techniques. Topics include: EM wave propagation, system error identification and analysis, representative surveying systems, baseline radio navigation systems and long line calculations and transformation techniques. Prerequisite: Math 32, Phys I, Cart I or Ocea 11.

160 Adjustment Computations I (3)

Basic adjustment theory. Prerequisite: Geod 150, Math 32, 124 (or equivalent experience). Stat 107 or permission of instructor.

161 Adjustment Computations II (3)

Topics in advanced adjustment theory. Applications to geodesy and photogrammetry. Prerequisite: Geod 160.

-66 Space Techniques for Geodesy (3–3)

Determination of the gravitational field, station positions and fundamental physical constants. Basic celestial mechanics, computing techniques and data analysis. Modern data acquisition systems. Prerequisite: Math 33, 124, Geod 150, 151; or equivalent experience.

graphy and Regional Science

man: M. Gordon, Professor of Geography and Regional Science; I-200, Tele- 676-6185

51 Introduction to Geography (3)

General survey of the systematic fields of human geography which play a role in the analysis and interpretation of man-environment relationships in both spatial and ecological contexts.

52 Introduction to Economic Geography (3)

Examination of the basic principles which determine the location of economic activities.

27 Population and Settlement (3)

Patterns of world population; factors contributing to population pressures, growth, and migrations.

132 **Resource Management and Conservation** (3)
Principles and practices in effective utilization of resources in the Un States and selected areas; public policies relating to conservation; envi mental systems, perception, and impact studies.

133 **Geography of Poverty and Hunger** (3)
Consideration of the locational aspects and correlates of poverty and h ger; rural and urban poverty regions; regional food budgets and tab programs concerned with the elimination of poverty and hunger.

141 **Urban Settlement** (3)
Distribution of urbanization on the surface of the earth; processes wh lead to urbanization; theories which can be used to analyze the locat of cities.

145 **Cultural Geography** (3)
Analysis of the relationships between culture and environment; empha on spatial and ecological considerations.

146 **Political Geography** (3)
Analysis of the interrelationships between the political community a the human and physical environment.

148 **Principles of Geography** (3)
Study of geographic principles, technology and tools designed to meet sp cific needs of teachers. Emphasis on the practical application of ge graphic concepts and the use of source materials in the classroom.

155 **Middle East** (3)
Survey of the cultural and physical regional patterns of the Middle East.

161 **Latin America** (3)
Examination of spatial characteristics of physical and cultural phenome in Middle and South America.

164 **Geography of China** (3)
Survey of the cultural and physical regional patterns of China.

208 **New Perspectives in Geography** (3)
An overview of recent trends in geographic research. Selected topics i clude diffusion processes, spatial behavior, locational analysis, and envi onmental perception.

224 **Seminar: Political Geography** (3)
Examination of the political factor in location theory and analysis of th nature of political territories.

243 **Seminar: Urban Geography** (3)
Functional processes affecting the evolving morphology and internal spa tial patterns of urban phenomena; emphasis on economic factors, be havioral considerations, and impact of time.

Geology

Chairman: F.R. Siegel, Professor of Geochemistry; Bell 3, Telephone 676-6190

1–2 **Introductory Geology for Nonscience Majors** (3–3) (Campus Course)
Lecture (2 hours), laboratory (2 hours). Survey covering the principles of geology; emphasis on man's effect on the environment. Laboratory fee, $15 a semester.

3 **Introductory Geology for Nonscience Majors** (3)
Nonlaboratory course for off-campus students only. Survey covering the principles of geology.

4 **Introductory Geology for Nonscience Majors** (3)
Geological periods, evolution of life on earth. Nonlaboratory course for off-campus students only. Prerequisite: Geol 1 or 3, or permission of instructor.

5 **Environmental Geology** (3) (Campus Course)
The relation of people and society to natural environment; population evolution and mineral resources; economic, legal, and political aspects. Laboratory fee, $15.

14 **Mineralogy and Petrology for Nonscience Majors** (3) (Campus Course)
Lecture (2 hours), laboratory (2 hours), field trips. Prerequisite: Geol 1 or permission of instructor.

105 **Geological Hazards in Land-Use Planning** (3) (Campus Course)
An analysis of geological hazards and related factors that affect land-use planning. Field trip. Prerequisite: Geol 5 or 21, or permission of instructor. Laboratory fee, $10.

125 **Marine Geology** (3) (Campus Course)
Lecture and map work. Principles of oceanography and submarine geology; topography, crustal structure, sedimentary processes, and marine environment. Prerequisite: Geol 1–2 or 21–22; or permission of instructor.

141 **Introductory Geochemistry** (3) (Campus Course)
Principles and theories on the abundance, relationships, and distribution of the elements in various rock and mineral species. Prerequisite or concurrent registration: Geol 117 or equivalent; Chem 11–12; Math 30; Phys 1 or 3; or permission of instructor. Laboratory fee, $5.

175 **Hydrogeology** (3) (Campus Course)
The occurrence, storage, movement, quality, and problems of pollution of subsurface water, and the hydrologic properties of water-bearing materials. Prerequisite: Geol 111, 122; Math 31; Chem 11–12; or permission of instructor.

manic Languages and Literatures

rman: C. Steiner, Associate Professor of German; Rice 408, Telephone 676-6195

lacement Examination: A student who has not been granted advanced standand who wishes to continue in college the language begun in high school must a placement examination before registration. Upon completion of the examin, assignment is made to the appropriate course.

1–2 **First-year German** (3–3) (Campus Course)

Fundamental concepts of German culture; essentials of German struc and basic vocabulary; reading of easy prose and conversation. Au oral practice in language laboratory. Prerequisite to Germ 2: Germ Laboratory fee, $17.50 a semester.

3–4 **Second-year German** (3–3) (Campus Course)

Introduction to German civilization, selections from modern Gern prose, continuation and review of German structure, conversation simple composition. Aural-oral practice in language laboratory. Pre quisite to Germ 3: Germ 1–2 or equivalent. Prerequisite to Germ Germ 3. Laboratory fee, $17.50 a semester.

Health Care Administration

Chairman: L. Gintzig, Professor of Hospital Administration; Binney 21, Telepho 676-6220

153 **Survey of Health Care Organization** (3)

Introduction to the organization and delivery of health care services the U.S. Emphasis on the structural features of and the resources ava able to the health care system.

154 **Introduction to Hospital Management and Procedures** (3)

Introduction to the structure and management of contemporary America hospitals; emphasis on the organization of hospital departments and the functions of the department manager.

202 **Introduction to Health Care Systems** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Introductor description and analysis of the American health and medical care sy tems. Organization, characteristics, and relationships of research, tech nology, manpower, public and private delivery, and financing mechanisms Survey of major disease problems and their impact on administration an planning. Medical terminology.

203 **Organization and Management of Health Care Institutions** (3)

Lecture and discussion (2 hours), laboratory (2 hours). History an current character of institutional providers of health care. Function organizational structure, and interrelationships of various types of health care facilities. Institutional ethics; statistics. Regulation of institutional providers.

205 **Hospital Administrative Practices** (3)

Lecture and discussion (2 hours), laboratory (2 hours). Organization management and interrelationships of hospital, clinical, support, and ad ministrative departments. Analyses of procedures and systems. Hospital personnel administration. Administrative ethics. Requirements of the Joint Commission on Accreditation of Hospitals. Prerequisite: HCA 203.

209 **Health Resources Management** (3)

Lecture (2 hours), laboratory (2 hours). Introduction to resource anal ysis, financial management, and health economics/statistics of health care

institutions. Estimates of health services demand and resource requirements. Preparation of budgets, financial statements and reports. Financial analysis. Public and private health insurance. Management of medical facilities and material. Regulation and containment of costs. Safeguarding hospital assets.

250 **Delivery of Mental Health Services** (3)

Study of the organizations and systems for the delivery of mental health services; emphasis on administration, management and financial support of treatment and rehabilitation facilities.

brew*

irman: J.E. Ziolkowski, Associate Professor of Classics; T-23, Telephone 676-

lacement Examination: A student who has not been granted advanced standing who wishes to continue in college the language begun in high school must take lacement examination before registration. Upon completion of the examination, ignment is made to the appropriate course.

1–22 **Beginning Hebrew** (3–3) (Campus Course)

Grammatical essentials of the language; readings selected from classical and modern texts; basic audio-lingual drills for comprehension and expression. Laboratory fee, $17.50 per semester.

3–24 **Intermediate Hebrew** (3–3) (Campus Course)

Intensive readings and text analysis, with opportunities to develop basic skills. Materials range from Israeli newspapers and scholarly journals to liturgical poetry and rabbinic narratives. Laboratory fee, $17.50 per semester.

lory

rman: Peter P. Hill, Professor of History; Lisner 503-F, Telephone 676-6761

ourse Accessibility: All second-group courses are open to students without His- ourse prerequisite.

9–40 **European Civilization in Its World Context** (3–3)

Hist 39: political, social, economic, and cultural history to early modern era. Hist 40: from early modern era to present.

1–72 **Introduction to American History** (3–3)

Hist 71: political, social, economic, and cultural forces of the United States in their world setting from the beginning to 1876. Hist 72: from 1876 to present.

1-32 **History of Germany** (3–3)

Political, social, and cultural development. Hist 131: from mid-17th century to Bismarck. Hist 132: from William II to present.

*istered by the Department of Classics.

138 **History of World Communism** (3)
The international communist movement from its beginning to the presen

145 **Imperial Russia** (3)
From the reign of Peter the Great to World War I.

146 **Soviet Russia** (3)
The Russian Revolution and Soviet rule to the present.

149–50 **European Diplomatic History** (3–3)
Emphasis on policies and actions of the great powers and their statesmen Issues of war and peace, international crises, nationalism, alliances, and ten sions. Hist 149: 1812 to 1890. Hist 150: since 1890. Students who receiv credit for Hist 150 cannot receive credit for Hist 157 *20th-century Europe an Diplomatic History*.

163–64 **History of Latin America** (3–3)
Hist 163: analysis of Spanish and Portuguese imperialisms in the New World, 1492-1820. Readings in sources and standard secondary works, au diovisual materials, field trips. Hist 164: a problems approach to Lati America, 1820 to the present; thematic emphasis on neo-colonialism, corpo ratism, liberalism, caudilloism, modernization, populism, and revolution.

181–82 **U.S. Diplomatic History** (3–3)
American foreign relations from the era of the American Revolution Hist 181: to 1898. Hist 182: 20th century.

195–96 **History of East Asia** (3–3)
Civilizations of China and Japan; emphasis on institutional developmen Hist 195: beginnings to about 1800. Hist 196: from eve of the moder era to present.

201 **History and Historians** (3)
Historiography and historical method for graduate students. Readings an discussion on major trends in history; selections from classics of historic literature. Students who receive credit for Hist 201 cannot receive cred for Hist 199 *Proseminar: Readings for the History Major*.

Human Kinetics and Leisure Studies

Chairman: J.L. Breen, Professor of Human Kinetics and Leisure Studies; K–20, Tel phone 676-6280

101 **Physical Education and Sports in Human Resource Centers** (3)
Development of physical education and sports programs in schools a play settings. Includes philosophy and curriculum.

105 **Introduction to Adaptive Physical Education and Therapeutic Re reation** (3)
Philosophy, methods, and concepts relating to recreation and adapt physical education for the ill, aged, and disabled. Concepts in progr planning, leadership, and adaptations of activities to special groups. cludes field visitation and analysis of activities.

219 Creative Dance for Children (3)

Dance as an expressive art medium for children; concepts, principles, methods, and materials. Emphasis given to dance in elementary education with consideration for special education.

284 Workshop (1 to 3)

(Formerly Workshop in Human Kinetics and Leisure Studies)

May be repeated for credit with permission of advisor.

202 Conceptual Basis of Motor Learning (3)

Variables of perceptual motor learning and performance; theories, concepts, and models of learning related to the development of motor skills.

205 Perceptual-Motor Programs (3)

(Formerly Perceptual-Motor Problems: Diagnostic Therapeutic Techniques)

Programs of perceptual-motor therapy; their basic assumptions and diagnostic-therapeutic techniques.

232 Current Issues in Elementary School Physical Education (3)

Current philosophy, trends, and research; implications for curriculum, instruction, evaluation.

239 Urban Recreation for Special Populations (3)

Development of recreation for the disabled, impaired, and handicapped using the Baltimore-Washington areas as the urban problem setting; development of competencies in community organization, communications, consultation, group dynamics, and interpersonal relations; program development and evaluation.

240 Physical Education for the Handicapped (3)

Adaptive physical education for handicapped populations; development of competencies in diagnostic-prescriptive teaching, program design and evaluation, consultation, and communications.

244 Therapeutic Recreation Practice (3)

Professional competencies for delivery of therapeutic recreation services to the handicapped populations in clinically oriented settings. Emphasis on client assessment activity analysis, treatment programming and evaluation and relationship of therapeutic recreation to total rehabilitation goals.

250 Administration of Tourism Services (3)

Planning and organization of a comprehensive system of tourism services utilizing educational, cultural, and recreational resources; emphasis on public relations, personnel administration and supervision, systems analysis, cost-benefit analysis, fiscal management, and managerial accountability.

256 Sports Medicine and Rehabilitation (3)

Theory and practice of therapeutic exercise and recreation as applied to the rehabilitation of the handicapped; injuries; preventive, adapted and remedial concepts; research in area of general rehabilitation practice; professional roles as related to ancillary medical focus.

260 Tourism Development (3)

Theoretical and practical framework for evaluating development models

using case studies which highlight existing organizational structures, d cision-making systems, and implementation procedures.

280 **Advanced Workshop** (1 to 3)

Emphasis on contemporary issues and problems; development of advanc professional competencies. May be repeated for credit with permission advisor.

283 **Practicum** (3 to 6)

Field work, internship and/or instructional practice, including conferenc and/or seminar. May be repeated once for credit with permission advisor.

297 **Advanced Topical Studies** (3 to 6)

Independent research and study pertinent to the needs of the student Prerequisite: Educ 295 or permission of instructor. May be repeate once for credit with permission of the advisor.

Italian*

Chairman: G.E. Mazzeo, Professor of Romance Languages; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Italian** (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Ital 2. For beginners. Pronunciation, conversation, grammar, composition, readings. Oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 **Second-year Italian** (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Ital 4. Conversation, grammar review, composition, reading of modern Italian prose, introduction to Italian civilization. Oral practice in language laboratory. Prerequisite: Ital 1–2. Laboratory fee, $17.50 a semester.

Journalism

Chairman: Philip Robbins, Associate Professor of Journalism; Stuart 301E. Telephone 676–6225

116 **Magazine Layout and Design** (3)

Layout, typography, and design for magazines, newsletters, house organs, and similar publications for associations, institutions, and industry.

* Administered by the Department of Romance Languages and Literatures.

145 Principles and Problems of Public Relations (3)

Principles, problems, and ethics of public relations for government agencies, commercial establishments, educational and other public institutions. Case histories of successful programs.

Enforcement Program

ulty Advisor: John H. McCalla, College of General Studies; Building F, Room 14, phone 676-7016

30 Introduction to Law Enforcement (3)

Survey of law enforcement: role of police officers; legal aspects; evidence; court procedures; investigation and crime prevention.

31 Introduction to Criminal Justice System (3)

Survey of components of the criminal justice system; the police, prosecution, defense, courts and corrections.

32 Police Organization and Administration I (3)

Introduction to police organization and administration. Discussion of organization, inspection, training, and the operational services of police departments.

40 Introduction to Industrial Security (3)

Survey of industrial security in the world of commerce. Discussion of the policies, functions, authority and limitations of industrial security personnel.

41 Physical Security (3)

Discussion of physical security policies and procedures in the collection, processing, manufacturing or treatment, storage, transportation and sale of products.

121 Survey of Forensic Science I (3)

Physical evidence in criminal cases: theory, principles, procedures, and techniques of examination of explosives, firearms and projectiles, tools, toolmarks, metallurgy, tire treads, shoeprints, footwear, fingerprint, voiceprint, polygraph, soils, plants, minerals, and plastics.

122 Survey of Forensic Science II (3)

Physical evidence in criminal cases continued: theory, principles, procedures, and techniques of examination of paints, pigments, wood, glass, questioned documents, body fluids, hairs, fibers, arson, toxicology, narcotics, medicolegal evidence, and photography.

123 Criminal Investigation (3)

In-depth analysis and discussion of investigative procedures in criminal cases: interviews and interrogation; surveillance and sources of information; investigation of crimes of violence and fraud emphasizing case-study approach.

131 Police Organization and Administration II (3)

Analysis of organizational structures in small, medium, and metropolitan size police agencies: purpose, functions, and divisions of responsibilities;

organizational communication factors. Administrative factors peculiar t police agencies in relationships with local governmental authorities, age cies, and community groups.

141 Criminal Evidence for Police (3)

Comprehensive analysis of the various forms of criminal evidence wit emphasis on judicial requirements for the presentation in court of crimina evidence in cases.

142 Criminal Law and Procedure (3)

Analysis of processes and procedures of investigation, indictment, adjudi cation, sentencing and conviction, and correctional procedures.

151 Criminal Law in the District of Columbia (3)

Comprehensive analysis of the criminal laws of the District of Columbia: judicial interpretations and application of court decisions to law enforce ment practices and procedures.

152 Criminal Law in Maryland (3)

Comprehensive analysis of the criminal laws of the State of Maryland: judicial interpretations and application of court decisions to law enforce ment practices and procedures.

153 Criminal Law in Virginia (3)

Comprehensive analysis of the criminal laws in the Commonwealth of Virginia: judicial interpretations and application of court decisions to law enforcement practices and procedures.

160 Presentation of Testimony (3)

Witness testimony in criminal cases presented in court: rules of evidence (competency, materiality, relevancy); admissibility of testimony; types of witnesses and depths of testimony; and judicial conduct of witness pro cedures.

162 White Collar Crime (3)

Discussion and analysis of the methods, forms, types, operations, and techniques of crimes of fraud, extortion, and intimidation: embezzlement, pilferage, securities, consumers, computers, insurance, bribes and bank ruptcy.

163 Police and Community Relations (3)

Factors in human relations as they affect policing and police management procedures, practices, and policies. Prejudice and discrimination and their effects on law enforcement agencies and officers in a changing society.

164 Evidence Photography (3)

Theories, principles, practices and procedures involved in use of photog raphy in the enforcement of law, investigation of crimes, and document ting scenes and information.

165 Organized Crime (3)

Survey and analysis of the origins, organizational structure, functions and actions of organized crime; governmental efforts to combat; and indica tions of organized crime recognizable by uniformed police officers.

180 Law of Arrest, Search and Seizure (3)

Intensive discussion and analysis of the laws of arrest, search and seizure as they affect the private citizenry and police officers; in-depth examina-

tion of court decisions (Miranda, etc.). Prerequisites: LEnf 142 and PSc 115.

anagement Science

irman: J.F. McCarthy, Jr., Associate Professor of Business Administration; lding G205, Telephone 676-7375

118 Introduction to Information Processing (3)

Basic principles, terminology, and methods of computer data processing. Introduction to the use of the computer as a tool through assignments illustrating typical problems encountered in business and government data processing. Assignments involve flow charting and computer programming in a higher level language (FORTRAN) and are run on the SGBA computer with the School's computer terminals. Laboratory fee, $25 (applicable to off-campus locations having access to the University and SGBA computer centers).

119 Computer Programming for Information Systems (3)

COBOL programming for business and government data processing applications. For students already familiar with basic computer concepts, flow charting, and programming. Emphasis on practical computer applications in accounting and management information systems. Prerequisite: Mgt 118 or Stat 97. Laboratory fee, $25 (applicable to off-campus locations having access to the University and SGBA computer centers).

120 Information Systems Development I (3) (Campus Course)

Assessment of the systems concept and its relationship to organizational information decision-making and management. Concepts and techniques involved in the initial development of new or revised computer-based information systems, e.g., systems analysis and design phases. Prerequisite: Mgt 118, 119; or permission of instructor. Laboratory fee, $25.

121 Information Systems Development II (3) (Campus Course)

A further examination of the information systems development process, including concepts and techniques for assessment, selection, introduction, operation, and maintenance of a newly designed automated information system. Prerequisite: Mgt 120 or permission of instructor. Laboratory fee, $25.

122 Special Studies in Information Systems (3) (Campus Course)

An independent or group-study project in information systems development which may involve faculty-supervised research, a case-study project, or field experience as an intern systems analyst in a local public or private organization. Prerequisite: Mgt 121 or permission of instructor.

201 Advanced Administrative Management (3)

Integrative approach to organization and management concepts, philosophy and theory as applied to all types of agencies and institutions. Evolution of management thought, functions, practices, and contemporary issues.

203 Mathematics for Management (3)

Mathematical concepts employed in the solution of management problems. Applications of analytical geometry, functions, elements of calculus,

and linear algebra to optimization problems. Prerequisite: knowledge of
gebra.

204 Quantitative Factors in Administration (3)

Survey of quantitative techniques in solution of management problem
Potentials and limitations of mathematical models and proper areas f
their application. Breakeven analysis, linear programming, probabilit
decision-making under uncertainty, queuing models, inventory models.

207 Human Behavior in Organizations (3)

Individual, group, intergroup, and other human behavior and develop
ment; application of behavioral science research to administration. Learn
ing exercises and practical applications emphasized. Prerequisite: Mg
201.

208 Current Issues in Organizational Behavior (3) (Campus Course)

Study of behavioral factors relating to issues such as automation, ethics
interpersonal relations, organizational change, and similar problems. Prob
lems in behavioral science research. Prerequisite: Mgt 207.

210 Behavioral Factors in the Process of Change (3) (Campus Course)

Review of research, theory, and practice related to the process of human
change. Students are provided the opportunity to apply their learnings
in various settings, and to demonstrate competence in various media.
This course emphasizes the relationship between theory and practice.
Prerequisite: Mgt 207 or permission of instructor.

212 Organizational Development: Concepts and Methods (3) (Campus Course)

Primarily for doctoral students. Examination of different concepts of or-
ganizational structure, processes, and growth. Models of organizational
change will be developed with a taxonomy of methods of initiating action
to further organizational development. Prerequisite: Mgt 207, 210; or
equivalent.

213 Consultative Processes in Organizations (3) (Campus Course)

Primarily for doctoral students. Examination through actual practice as
well as theory of the nature of the helping process between one person or
group and another person or group. Dynamics of the consulting process
will be explored as well as role differences in internal and external con-
sultation. Development of skill in the helping relationship will be fur-
thered. Prerequisite: Mgt 207, 210; or equivalent.

225 Managerial Statistics I (3)

Mathematics of probability and statistics and application to management
science and operations research. Topics include sample spaces, random var-
iables, discrete and continuous probability distributions, moments, sampling
theory, and point and interval estimation. Prerequisite: Mgt 203 or equiva-
lent.

226 Managerial Statistics II (3)

Applications of the theory and techniques of mathematical statistics
Topics include hypothesis testing, nonparametric methods, analysis o
variance, regression and correlation. Prerequisite: Mgt 225.

227 **Mathematical Programming: Techniques and Applications** (3)

Technical and applied considerations of linear programming and related methods. Mathematical and computational aspects of linear programming. Formulation of linear programming models. Studies of applications of linear programming. Introduction to integer programming, algorithms, and formulations. Prerequisite: Mgt 203 or equivalent.

228 **Techniques of Operations Research** (3)

Survey and introduction to contemporary operations research techniques, including nonlinear programming, dynamic programming, inventory and queuing models and simulation. Applications of such methods as models of common processes. Prerequisite: Mgt 225, 227.

229 **Seminar: Management Sciences and Operations Research** (3)

Advanced modeling exercises in applied operations research. Prerequisite: Mgt 228 or permission of instructor.

230 **Administration of Research and Development** (3)
(Formerly BAd 220)

Examination of technological, political, and economic factors affecting the R&D environment; operational aspects; management problems in military, governmental, and industrial organizations; project selection, resource allocation, personnel, planning and control, measurement and evaluation.

232 **International Research and Development** (3)
(Formerly BAd 222)

Technological, political, social, and economic factors affecting international R&D policy; problems in industrial, governmental, and international organizations; world technological forecasting; resource allocation; technology transfer. Prerequisite: Mgt 230 or permission of instructor.

33–34 **Technology Assessment Theory and Practice** (3–3)
(Formerly BAd 223–24)

Mgt 233: the technology assessment concept. Methods for conducting assessments. Management of assessments. Evaluation of selected assessments. Mgt 234: planning and conducting a technology assessment. Prerequisite to Mgt 234: Mgt 233 or permission of instructor.

239 **Seminar: Administration of Research and Development** (3)
(Formerly BAd 229)

Individual and/or group in-depth research projects dealing with various phases of research and development management. Topic will vary each time the course is offered according to the emerging technology, current operational problems, and student interest. Prerequisite: six to nine semester hours of research and development management or permission of instructor.

240 **Survey of Information Technology** (3)

Management oriented survey of key areas in information technology, including hardware, software, systems development, EDP management, and the computing milieu. Laboratory fee, $25 (applicable to off-campus locations having access to the University and SGBA computer centers).

241 **Management Information Systems Development and Application** (3)

Contemporary theories and practices in the development of management information systems. Participation in the design of information systems

specifications. The roles of both management and systems design pers
nel in the systems development process studied and evaluated. Impact
management information systems upon the organization and its decisi
making processes evaluated. Case studies. Prerequisite: an introducto
course in information technology, or permission of instructor.

242 **Comparative Computer Systems** (3)

Characteristics and capacities of the range of information processi
equipment in use today. Recent and prospective equipment and softwa
development. Selection of computers and related software and equipme
Prerequisite: Mgt 241 or permission of instructor.

243 **Management of Information Technology** (3)

Advanced course emphasizing principles, practices, and trends in the ma
agement of information technology. Case studies. Prerequisite: Mgt 24
242; or permission of instructor.

244 **Information Systems and Telecommunication** (3)

Principles of telecommunications; the applications of telecommunicatio
for the transmission of data between computers, between humans, b
tween humans and computers. Telecommunications terminology, hardwa
and software considerations, legal and policy issues, recent development
and calculations necessary for the specification and design of telecommun
cations systems. Laboratory fee, $25 (applicable to off-campus location
having access to the University and SGBA computer centers).

245 **Data Base Management** (3)

An in-depth approach to the understanding and use of the latest tech
niques for developing and implementing an effective data base system
Topics include data base organization, creation, and maintenance; effor
and economic justification; evaluation criteria; standardization of data bas
systems; impact of packaged data management systems; and an analysis o
the current state-of-the-art in data base development. Students will be
come proficient in the use of an actual data base management system
Prerequisite: Mgt 119, 241. Laboratory fee, $25 (applicable to off-
campus locations having access to the University and SGBA computer
centers).

246 **Workshop in Data Base Management Systems** (3) (Campus Course)

Analysis and solution of complex business information problems through
commercially available data base management systems; development o
evaluation methodology, management of implementation strategies. Stu-
dents will obtain "hands-on" experience with at least four major com-
mercial systems. Prerequisite: Mgt 245. Laboratory fee, $25.

247 **Higher Level Programming Languages for Business Applications** (3)
(Campus Course)

Use of major programming languages in business environments. Topics fo
each language will include: syntax and semantics, ease of learning, codin
and debugging, documentation standards and maintenance, suitability fo
business problem area and projected users, availability of language on larg
scale through mini-computers, typical business applications, conversio
problems. Prerequisite: Mgt 118 or equivalent. Laboratory fee, $25.

248 **Design of On-Line Information Systems** (3) (Campus Course)

Introduction to the analysis, design and implementation of on-line busines
information systems. Topics will include: requirements analysis, function

specifications, file design, man-machine dialog design, response time requirements, user psychology, human channel and buffer capacity. Prerequisites: Mgt 118 and 241 or equivalents. Laboratory fee, $25.

249 **Seminar: Information Technology** (3)

Current problems in the design and implementation of computer supported systems; emphasis on current state-of-the-art through discussion with leading experts in the field and analysis of literature. Prerequisite: Mgt 241, 242, 243; or permission of instructor.

260 **Introduction to General Systems and Cybernetics** (3)

Analysis of fundamental general systems and cybernetic concepts evolving in various branches of knowledge and academic disciplines, emphasizing their transcontextual and interdisciplinary nature, e.g., stability, equilibrium homeostasis, feedback, regulation, equifinality, self organization, variety, uncertainty, redundancy, paradox, first and second order cybernetics, and self reference.

261 **Fundamentals of General Management Systems and Organizational Cybernetics (GEMSOC)** (3)

Dynamics of organization and management from a general systems and cybernetics viewpoint. Translation of GEMSOC research and theory into the world of organizational behavior and management practice. Prerequisite: Mgt 260.

263 **Case Studies and Field Research in GEMSOC** (3)

Investigations of existing organizational structures and ongoing management processes from a GEMSOC standpoint. Operational evaluations of firms and agencies, including intercontextual comparative studies. Prerequisite: Mgt 261.

264 **GEMSOC Modeling and Simulation** (3)

(Formerly Organizational Dynamics Simulation and Metasystemic Modeling)

Literature review and current practice analysis; modeling and simulation exercises. Continuous and discreet representations: system dynamics, set theory, kinematic graphs, information theory. Prerequisite: Mgt 261, 263.

80–81

–82 **Managerial Aspects of National Security** (3 or 4–3 or 4–3)

The application of business management principles to the military aspects of national security; organization and administration of the federal government for national defense; management of national resources (natural, human, energy, economic); budgeting and controllership; determination of requirements; procurement; production; supply management; and communications.

295 **Research Methods** (3)

Research techniques, sources of information, array and analysis of data, interpretation and presentation of the findings.

ble only to students in the Master of Science in Administration program at the Industrial of the Armed Forces.

Mathematics

Chairman: T.P.G. Liverman, Professor of Mathematics; Library 719J, Telepho 676-6235

No Mathematics courses numbered 1 to 100 are available for college credit if t student's previous training in mathematics meets the prerequisite for a higher nu bered course.

Graduate credit may not be given for Mathematics courses numbered from 1 to 200 without the permission of the Chairman of the Department.

3 **College Algebra** (3)

Equivalent to the standard two years of high school algebra with sever additional topics. Prerequisite: one year each of high school algebra a high school geometry.

6 **Plane Trigonometry** (3)

Prerequisite: two years of high school algebra and one year of high scho geometry, or Math 3 (or concurrent registration).

9 **General Mathematics I** (3)

For students electing Math 9 and 10 as a terminal sequence. Logic, set Euclidean and non-Euclidean geometries, algebra, calculus. Prerequisite two years of high school mathematics.

10 **General Mathematics II** (3)

Probability and statistics. The computers. Modern mathematical systems applications to the social sciences and humanities. Prerequisite: Math 9.

30 **Precalculus** (3)

Set theory, inequalities, basic analytic geometry, functions and relations Polynomial, trigonometric, logarithmic, and exponential functions. Pre requisite: Math 3 and 6; or one and one-half years of high school algebra one year of high school geometry, and one-half year of high school trig onometry; or equivalent. Prior to registration, new students must take a placement examination in algebra and trigonometry.

*31 **Calculus of One Variable** (3)

Differentiation and integration of algebraic and elementary transcendental functions, with simple applications. Prerequisite: Math 30 or equivalent

32 **Calculus of Several Variables** (3)

Techniques of integration, partial derivatives, and multiple integrals Prerequisite: Math 31.

33 **Calculus of Vector Functions** (3)

Infinite series, Taylor series, algebra and calculus of vectors, vector fields line integrals, Green's and Stokes' theorem. Prerequisite: Math 32.

*41 **Calculus for Economists I** (4)

Differentiation and integration of algebraic and elementary transcendental functions; marginal analysis for functions of one variable; optimization of one variable applied to economics. Prerequisite: Math 30 or equivalent

* Math 30 may be waived as a prerequisite by examination on scheduled dates.

42 **Calculus for Economists II** (4)

Elementary linear algebra with economics applications, including input-output models; partial derivatives; multiple integrals; marginal analysis for functions of several variables; optimization of functions of several variables applied to economics; infinite series. Prerequisite: Math 41.

*51 **Mathematics for the Social and Management Sciences I** (3)

Notion of function, graph of function, and sequences; differential calculus of functions of one variable; exponential and logarithmic functions. New students must take a placement examination in algebra prior to registration.

*52 **Mathematics for the Social and Management Sciences II** (3)

Integral calculus of functions of one variable; functions of several variables; partial derivatives, maxima and minima, Lagrange multipliers; systems of linear equations and inequalities; matrix algebra, determinants, rudiments of linear programming. Prerequisite: Math 51.

111 **Mathematics for Engineers and Physicists I** (3)

Linear differential equations, linear algebra, Fourier series and integral, nonlinear differential equations of the first order. Prerequisite: Math 32.

112 **Mathematics for Engineers and Physicists II** (3)

Ordinary differential equations, systems of differential equations, boundary-value problems, partial differential equations. Prerequisite: Math 111.

124 **Introduction to Matrix Theory** (3)

Operations on matrices, linear equations, matrix inversion, vector spaces, characteristic roots and vectors, Hamilton-Cayley Theorem. Systems of linear difference and differential equations. Quadratic forms. Prerequisite: Math 32 or permission of instructor.

134 **Introduction to Boundary-value Problems** (3)

Prerequisite: Math 111 or 142, *Theory of Differential Equations.*

139 **Advanced Calculus I** (3)

Topology of R^n, continuous mappings, uniform convergence, and differential mappings. Prerequisite: Math 33.

140 **Advanced Calculus II** (3)

Contraction maps, implicit functions and differential equation theorems, integration theory. Prerequisite: Math 139 or equivalent.

153 **Introduction to Numerical Analysis** (3)

Introduction to fundamentals of numerical analysis using modern digital computers. Solution of linear systems and of ordinary differential equations. Interpolation polynomials. Iterative solution of nonlinear equations. Simple quadrature techniques. Prerequisite: Math 33 or equivalent.

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an: George Steiner, Professor of Music; S–11, Telephone 676-6245

and management science students with a strong record in high school mathematics are ad-
ke Math 31, 32, and 124 instead of Math 51 and 52.

3 Introduction to Musical Understanding (3)

Introductory history of musical styles, related to listening; study of m materials and media.

4 Survey of Music Literature (3)

Introductory study of musical forms, structures, and textures; aural an sis of selected literature.

Oceanography*

Program Advisor: Hyman Orlin, Professorial Lecturer in Cartography, Geodesy, a Oceanography, Building F, Telephone 676-7000 or 946-3557

11 Navigation (3)

Theory of navigation, charts, navigation aids, celestial navigation, sh board instruments. Prerequisite: college algebra, trigonometry, a Engl 10.

101 Oceanography for Science Majors I (3)

Chemical and physical properties of the oceans; composition of seawat heat budget, distribution of variables, statics, dynamics, water mass general circulation of the oceans, underwater sound, and propagati of light. Laboratory and field trips as arranged. Prerequisite or concu rent registration: Math 31, Phys 1 or 3, or permission of instructor.

102 Oceanography for Science Majors II (3)

Physiography and characteristics of the sea floor, ocean basins and ma gins. Marine biology and ecology. Laboratory and field trips as arrange Prerequisite or concurrent registration: Geol 1 or 3 or 21; BiSc 11; permission of instructor.

103–4 General Oceanography (3–3)

Ocea 103: general circulation of the oceans; waves, tides, and properti of sea water; history and methods. Ocea 104: topography and sedimen of the ocean floor; life in the sea; and interrelationships of the marin sciences. Field trips as arranged. Courses may be taken independently

105 Elementary Geophysics (3)

Gravity geomagnetism, and seismology in cartography, geodesy, an oceanography. Prerequiste: Math 32, Phys 1 or 3.

106 Physical Science Data Analysis (3)

Elementary analysis of cartographic, geodetic, and oceanographic dat Basic concepts of probability, sample statistics, probability distribution confidence intervals, estimation and tests of hypotheses as related to carto graphic, geodetic, and oceanographic data. Prerequisite: Math 30, Oce 101–102.

107 Introduction to Meteorology (3)

An introduction to meteorology including synoptic meteorology, weath forecasting, general circulation of the atmosphere, and air pollutio Prerequisite: Math 30.

* Affiliated with the Department of Geography and Regional Science.

110 Physical Oceanography (3)

Physical properties of sea water, underwater sound, and propagation of light. Currents, heat budget, turbulence, and the general circulation and water masses of oceans. Laboratory and field trips as arranged. Prerequisite: Math 32, Ocea 101, Phys 1 or 3, or permission of instructor.

111 Ocean Waves and Tides (3)

Basic tidal theory; wind waves, seiche, storm surge, and tsunami; analyses and principles of prediction. Field trips as arranged. Prerequisite: Math 32, Ocea 101, or permission of instructor.

112 Biological Oceanography (3)

The study of life in the sea. Biogeography, description, systematics, characteristics of ecology of marine animal and plant groups. Primary productivity and organic food cycles. Biological sampling procedures. Bioluminescence. Symbiotic relationships. Biodeterioration processes and pollution problems. Laboratory and field trips as arranged. Prerequisite: Ocea 102, BiSc 11.

113 Marine Geophysics (3)

Principles of marine geophysical measurements and interpretation. Prerequisite: Ocea 105, Phys 1 or 3.

114 Chemical Oceanography (3)

Chemical processes in the marine environment, including composition of sea water, nutrients, natural composition and variation, carbonate cycle, and extraction. Prerequisite: Chem 12, Ocea 101.

115 Geological Oceanography (3)

Physiography of the sea floor and processes active in ocean basins and margins. Laboratory and field trips as arranged. Prerequisite: Ocea 102, 105, Geol 1 or 3 or 21, or permission of instructor.

120 Coastal Ecology (3)

Coastal ecosystems and how they function; the impact of man's activities. Impact of specific topical activities. Prerequisite: Ocea 101, 102, or 103–4, or permission of instructor.

122 The United States and the Oceans (3)

Tracing the nation's involvements in marine affairs; the effect upon domestic policy regarding alternative ocean uses.

124 Introduction to the Law of the Sea (3)

The changing role of the oceans in international relations: marine activities and ocean law, evolution of the law of the sea since 1960, analysis of major categories of ocean use.

130 Fisheries Biology and Management (3)

Examination of ocean and fresh water yields; emphasis on effect on populations fished, maximum and optimum yields, and how, for whom, and for what purpose fisheries are regulated.

132 Environmental Influences on Marine Living Resources (3)

The relations between living marine resources and the environment. Climate conditions which determine oceanic conditions. The effect of fluctuations in environmental conditions on distribution and/or abundance

of resource species. Prerequisite: Ocea 101, 102 or Ocea 103–4 equivalent experience.

135 **Oceanographic Instrumentation** (3)

Techniques and problems in making oceanographic measurements. Vari sensors are discussed with respect to their characteristics, design and ap cation. Ocean engineering related to measurement techniques are discus Prerequisite: Ocea 101–102, 105, Phys 1 or equivalent experience.

Oral Biology

Program Advisor: E.A. Caress, Assistant Dean of the Graduate School of Arts a Sciences; Bacon 201, Telephone 676-6210

The courses listed below are open only to students in the program of study leadi to the degree of Master of Science in Special Studies with a concentration in O Biology. This degree program is offered by the Graduate School of Arts and S ences in cooperation with the Army Institute of Dental Research at the Walter Re Army Medical Center (see page 85).

207 **Physical Diagnosis** (1)

208 **Biochemistry** (1)

209 **Pharmacology** (1)

210 **Microbiology** (2)

211 **Biostatistics and Research Methodology I** (2)

212 **Biostatistics and Research Methodology II** (1)

213 **Oral Pathology I** (2)

214 **Oral Pathology II** (2)

215 **Human Anatomy** (1)

216 **Dental Materials** (1)

218 **Perspectives in Clinical Human Nutrition** (1)

The object of this course is to cover recent advances in basic and applie nutrition which are relevant to current medical and dental practice. Em phasis will be placed on regulation of energy intake and the types o pathology associated with dietary imbalance encountered in the averag patient population. It is anticipated that the student will be able to utiliz the concepts learned in this course for the clinical evaluation and treatme of nutritional problems encountered in patients.

Pharmacology

Chairman: H.G. Mandel, Professor of Pharmacology; Ross 640, Telephone 67 3541

115 **Drug Abuse Education** (3)

Psychological and sociological bases of drug abuse, pharmacological and toxicological aspects of drug action on both the brain and peripheral organ systems; legal and societal implications of and reactions to drug abuse. Lectures and discussions on alcohol, narcotics, central nervous system stimulants and depressants, marijuana and hallucinogenic and psychedelic drugs.

215 **Adolescent Drug Abuse** (3)

Primarily for teachers, counselors, and administrators. Multidisciplinary lectures and discussions concerning the physiological and psychological effects of narcotics, central nervous system stimulants and depressants, alcohol, and hallucinogenic and psychedelic drugs; psychosocial factors leading to adolescent drug abuse; legal implications of drug abuse; prevention, control, and treatment of drug abuse.

ilosophy

irman: R.H. Schlagel, Professor of Philosophy; Rice 611, Telephone 676-6266

45 **Introduction to Logic** (3)

Deduction, induction, and legal reasoning; emphasis on recognition of fallacies and practical applications of logic.

50 **Introduction to Philosophy** (3)

Readings from major philosophers and study of philosophic positions from Plato to the present.

193 **Contemporary Philosophy: Phenomenological** (3)

The phenomenological movement, including its development into German and French existentialism, and more recent phases.

sics

rman: N.K. Khatcheressian, Associate Professor of Physics; Corcoran 103, Tele- 676-6275

ONOMY

9–10 **Introduction to Astronomy** (3–3) (Campus Course)

Lecture (2 hours), recitation (1 hour), laboratory (2 hours). Classical through modern astronomy with introduction to basic principles underlying astronomical systems and observations. Primarily for nonscience majors. Laboratory fee, $11 a semester.

CS

1 **Foundations of Physics** (4) (Campus Course)

Lecture (2 hours), recitation (1 hour), laboratory (2 and one-half hours). Development of conceptual principles underlying modern physical knowledge; basics of mechanics, heat and electromagnetism, including the clas-

sical concepts of energy, momentum, heat, temperature, entropy, ele and magnetic fields, optics. Prerequisite: two years of college prepara mathematics or concurrent registration in Math 6. Laboratory fee,

2 **Introduction to Modern Physics** (4) (Campus Course)

Topics focusing upon present understanding of the physical universe character of the atomic and subatomic worlds. Includes consideration length and time in relativity theory, present understanding of gravitat wave-particle duality, quantum theory, nuclei, subnuclear particles. requisite: Phys 1 or equivalent. Laboratory fee, $18.

*3 **Foundations of Physics** (3)

Same as Phys 1 without laboratory.

†4 **Introduction to Modern Physics** (3)

Same as Phys 2 without laboratory.

Political Science

Chairman: B. Reich, Professor of Political Science and International Affairs; C-6 Telephone 676-6290

Departmental prerequisite: PSc 1 and 2, or their equivalent, are prerequisite to second-group courses in political science and service-learning political science.

1 **Introduction to Comparative and International Politics** (3)

Comparative and international political systems; emphasis on structures a processes of major foreign governments and the force of basic ideologies.

2 **Introduction to American Politics and Government** (3)

Structure, powers, and processes of the American political system.

3 **Introduction to Political Behavior** (3) (Campus Course)

Study of political behavior, including the role of politics in today world, the sources of elite and mass political behavior, and the influen and nature of political institutions.

105 **Political Theory: Major Issues of Western Political Thought I** (3)

Foundations of Western political thought—Plato to Aquinas.

106 **Political Theory: Major Issues of Western Political Thought II** (3)

Theoretical roots of modern political order and disorder—Machiavelli Rousseau.

110 **American Political Thought** (3)

Political thought in the U.S. from colonial times to the present as se through major representative writings.

111 **State and Urban Politics** (3)

Comparative analysis of context, institutions, processes, and policies state and urban political systems.

* This course may not be taken by students who have completed, or are enrolled in, or plan enroll in Phys 1.

† This course may not be taken by students who have completed, or are enrolled in, or plan enroll in Phys 2.

112 State and Urban Policy Problems (3)

Selected issues in state and urban policy-making, with emphasis on urban and metropolitan settings.

114 U.S. Constitutional Law and Politics I (3)

Separation of powers, federal-state relationships, economic regulation.

115 U.S. Constitutional Law and Politics II (3)

Political and civil rights.

116 The American Presidency (3)

Examination of the politics of presidential selection, the authority of the contemporary institution, the mechanisms and processes for formulating public policy, and the influences of personality on performance.

117 Public Administration and Bureaucratic Politics (3)

Basic concepts in public administration; influence of bureaucratic politics on policy formulation and implementation.

118 Legislative Process (3)

Study of Congress, including theories of representation, legislative power structure, selection of legislators and the roles they play, decision-making, and the relationship between the legislative and executive branches.

119 U.S. Political Parties and Politics (3)

Role of parties as a linkage between mass preferences and government policies. Organization, nominations, voting, and activities in legislative and executive branches.

130 Comparative Government and Politics (3)

Comparative political analysis with primary focus on the principal states of Western Europe.

131 Comparative Government and Politics (3)

Government and politics of the communist nations; emphasis on the Soviet Union and countries of Eastern Europe.

140 International Politics (3)

International actors, international and domestic environments of foreign policy, global and regional patterns, general characteristics of foreign policy.

142 International Organizations (3)

Development and operations of the United Nations, regional organizations, and functional international organizations.

144 Public International Law (3)

(Formerly Public International Law and Organization)

Survey of international law; emphasis on development and trends.

146 U. S. Foreign Policy (3)

Constitutional, political, and international factors that determine the formulation, execution, and substance of U.S. foreign policy.

170 **Governments and Politics of China and Japan** (3)
Political institutions and processes of China since 1949 and of Ja since 1945. Influence of indigenous traditions and foreign contacts.

173 **Governments and Politics of South and Southeast Asia** (3)
Domestic and international politics of the area's major states.

177 **Governments and Politics of the Middle East** (3)
Politics of the eastern Arab states, Turkey, Iran, Israel.

180 **Governments and Politics of North Africa** (3)
Domestic and international politics of Algeria, Tunisia, Morocco, Liby Egypt, Sudan; their relations with states of the Middle East.

181 **Politics of Middle and Southern Africa** (3)
Comparative analysis of political systems in selected countries of no Mediterranean Africa.

203 **Public Policy Analysis** (3)
Reading and research on systematic methods of public policy analysi

204 **Methods of Legislative Research** (3)
The process of empirical research: construction of research design, da collection, and analysis. Techniques discussed will include content analy sis, survey research, and analysis of institutional voting.

212 **Urban Politics** (3)
The socioeconomic, demographic, and cultural context of urban politics informal patterns of power and influence in urban decision-making formal institutions and policy-making processes; urban policies and thei impacts.

215 **Judicial Policy-making** (3)
Role of the judiciary in policy formulation; emphasis on the U.S. Supreme Court and civil liberties issues.

216 **American Presidency** (3)
Personalized and institutionalized aspects of the presidency with particu lar emphasis on the politics of legislative policy-making.

218 **Legislative Theory and Behavior** (3)
Organization, behavior, and policy outputs of the U.S. Congress.

219 **American Political Parties and Interest Groups** (3)
Nature and functions of political parties and interest groups, with specif emphasis on the party influences on electoral behavior and congressiona decision-making.

220 **Public Opinion and Political Socialization** (3)
(Formerly Public Opinion and Voting Behavior)
Sources and dynamics of public opinion, political socialization, an voting behavior.

222 **Government, Science, and Technology** (3)
National and international policy issues which arise from the interactic

between scientific and technological development and governmental activity.

223 Science, Technology, and Public Affairs (3)
Selected public policy issues with significant scientific or technological aspects.

224 Domestic Policy Analysis—Selected Topics (3)
Analysis of U.S. policy toward selected domestic problems.

225 Economic Policy Analysis (3)
Analysis of selected topics in U.S. monetary and fiscal policy.

226 Legislative Elements in Economic Policy Development (3)
Economic analysis of selected legislative issues and the effect of various economic pressures on policy outcomes.

230 Comparative Government and Politics I (3)
Examination of basic approaches to comparative politics.

231 Comparative Government and Politics II (3)
Comprehensive examination of specific issue areas in comparative political analysis.

234 Comparative Legislative Systems (3)
Selected problems of legislative theory and behavior from a comparative perspective with particular reference to the parliamentary systems of West Germany, France, and Britain.

246 U.S. Foreign Policy (3)
Research and selected reading as the basis for analysis of U.S. foreign policy. Particular reference to the decision-making process and policy execution.

249 U.S. National Security Policy (3)
Fundamental considerations; selected issues, e.g., arms control and disarmament, regional security problems, military assistance.

250 Foreign Policy Analysis—Selected Topics (3)
Analysis of U.S. foreign policy toward selected world regions.

269 Soviet Military Policy and Strategy (3)
Soviet developments in military policy and strategy with attention to intra-bloc military cooperation, political context of Soviet military policy, significant changes in recent Soviet military thought.

286 Selected Topics in American Politics (3)
Readings and discussion.

hology

an: J.N. Mosél, Professor of Psychology; GG-211, Telephone 676-6320

artmental prerequisite: Psyc 1 or 5 or 6 is prerequisite to all other courses chology. Six semester hours in psychology courses are prerequisite to psy-

chology courses numbered above 100. The departmental prerequisite may be wai with the permission of the instructor.

1 General Psychology (3)
Fundamental principles underlying human behavior.

8 Psychology of Motivation and Personality (3)
Introduction to the psychology of personality. Principles of motivati personality development, social and cultural factors, and assessment a description of personality emphasized.

22 Introduction to Educational Psychology (3)
The contributions of psychology to education; emphasis on learning.

25 The Theory and Practice of Counseling Special Populations (6)
The organic and behavioral bases for abuse of alcohol and drugs. Speci focus on medical, psychological, and psychiatric issues. Social, economi political, and legal systems in relation to abuse and the psychological tec niques for helping the abuser develop independence from the habit. A sy thesis of modern counseling techniques will be emphasized.

29 Psychology of Childhood (3)
Developmental approach to study of the child. Emphasis on the socializa tion process, learning, and the child's view of the world.

101 Abnormal Psychology (3)
Causes, diagnosis, treatment, and theories of various types of maladjust ments and mental disorders.

112 Psychology of Adolescence (3)
Psychological characteristics and problems peculiar to adolescence, with emphasis on application of psychology to solution of such problems.

121 Psychology of Learning (3)
Theories and issues related to basic learning processes as determinants of behavior. Emphasis on current research using both human and anima subjects.

129 Theories of Personality (3)
Survey of personality theories; emphasis on their application to problem of individuals.

131 Psychological Tests (3)
Survey of psychological tests and their more common uses in business industry, government, law, medicine, and education. Material fee, $7.

144 Personnel and Industrial Psychology (3)
Psychological concepts and methods applied to problems of personne management, human engineering, employee motivation and productivity

145 Psychology of Management (3)
Psychological aspects of managing work organizations. Departmental pre requisite waived.

146 **Psychotechnology of Learning and Training** (3)

Psychological principles, concepts, and techniques of human learning and behavioral modification as applied to the design and operation of training and development systems.

151 **Social Psychology** (3)

Social foundations of attitudes and behavior: cognition, motivation, role-behavior, communication, small-group processes, racial attitudes, nationalism and war.

156 **Psychology of Attitudes and Public Opinion** (3)

Psychology of opinion formation, measurement of opinion, social determinants of attitudes, psychological processes in propaganda, bases of receptivity to propaganda, psychological warfare.

175 **Career Development in Youth and Maturity** (3)

Emphasis on the development of long-range career objectives based on review of experiences, the results of psychological testing, seminar discussion groups, and guided independent study. Analysis and practice of the specific skills needed to negotiate for advancement or to accomplish a career change.

191 **Independent Research in Psychology** (3) (Campus Course)

Opportunity for work on individual library or experimental projects. Open to qualified students by permission; arrangements must be made with the sponsoring faculty member prior to registration. May be repeated once for credit.

211 **Assessment of Cognitive Functioning** (3)

Concepts of intelligence and achievement and their assessment through a variety of individual procedures. Emphasis on evaluation of children. Material fee, $7. Admission by permission of instructor.

245 **Seminar: Organizational Behavior** (3)

Analysis of organizational behavior; emphasis on motivation and productivity. Recent research on employee attitudes, primary group, supervisory leadership, formal and informal organization, job design.

246 **Seminar: Personnel Measurement Techniques** (3)

Detailed consideration of techniques of personnel selection and performance evaluation. Employment tests, personal data, assessment interviews, and performance ratings.

blic Administration

rman: Bayard L. Catron, Associate Professor of Public Administration; D-407, hone 676-6295

210 **Concepts and Issues in Public Administration** (3)

Introduction to graduate study in public administration. Professionalism and the public service. Nature of public interest; multiplicity of organizational objectives. Administrative responsibility and individual and organizational ethics. Individual goals and career planning.

213 **Administration in the Federal Government** (3)

Critical analysis of federal administrative organizations as an integral p of the political system. Roles of Congress, the President, the courts, int est groups, political parties, and the public in the public decisional proce Special attention to centripetal and centrifugal forces.

214 **Policy Analysis in Public Administration** (3)

Introduction to systematic analysis of public policy alternatives. Develo ment of conceptual frameworks for differentiating types of public policie e.g., distributive, regulatory, redistributive; examination of the contrib tion of economic, quantitative and research techniques to the develo ment, administration, and evaluation of these policies.

223 **Behavioral Factors in Large and Complex Organizations** (3)

Analysis of the nature and characteristics of large organizations. Bureau cracies and their behavioral patterns; dysfunctionalism. Approaches t policy guidance and leadership, particularly in large public organizations influence and control systems. Future trends.

231 **Public Personnel Administration** (3)

Survey of basic principles and functions of personnel administration in th public service. Roles of personnel management, recruitment, placement wage and salary administration, training, retirement, and other personne functions.

232 **Problems in Public Personnel Management** (3)

Analysis and evaluation of major personnel management problems in gov- ernment; employee-management relations; interagency and intergovern- mental relationships. Impact of automation. Evaluation of personnel systems.

233 **Seminar: Manpower Development and Utilization** (3)

Examination of public and private manpower trends, problems, policies, and programs. Exploration of approaches, old and new, to manpower development and utilization. Analysis of impact of economic, political, and social factors on manpower. Students will select a specific area for individual investigation.

235 **Seminar: Technology Change and Professional Human Resource Planning** (3)

Research, discussion, and readings dealing with human resource problems arising from automation and other technological changes. Evaluation of these developments in government, business, and educational organizations, and their implications for productivity, employment, training, and educa- tion. Analysis of economic, political, and social factors influencing public and private human resource policies.

236 **Labor-Management Relations in the Public Sector** (3)

Principles and current issues in public sector labor relations; collective bargaining and the merit concept, scope of bargaining, representation elections, unfair practices, grievance procedures, bilateralism and the management process.

245 **Intergovernmental Relations** (3)

Assessment of the impacts and consequences of changes in the adminis- tration of intergovernmental policies and programs in the federal system. Legislation, roles and responsibilities of federal, state, regional and local

systems will be examined from both theoretical and practical vantage points to understand their effects.

248 **Financing Local Government** (3)

Analysis of the structure and administration of public finance in local governments. Includes the financing of services through municipal taxation and other revenue sources, debt administration, and implications of the budgetary process.

249 **Urban Public Policy** (3)

Examination of views of the city. Emphasis on urban systems in their social, political, economic, and physical aspects. Against the background of urban politics and administration, will address such central functional areas as health, education, welfare, crime, poverty, transportation and housing.



phreys Hall, the Engineer Center, Fort Belvoir, Va.—Locale for graduate es in Civil Engineering and a graduate degree program in Public Administra-

250 **Administration of State and Local Governments** (3)
Examination of state and local governmental structures and functions, public and private demands, their place within the federal system, their limitations, and alternatives available to encourage more effective administration.

251 **Governmental Budgeting** (3)
Survey of the basic concepts, principles, and practices in governmental budgeting; interrelationship of planning, programming, and budgeting; their role in the management process.

252 **Public Expenditure Analysis and Planning** (3)
Intensive analysis of managerial and economic procedures and techniques used by government agencies for planning, allocating, and managing scarce resources in the achievement of public programs. Topics discussed include benefit-cost analysis, program budgeting, systems analysis, present value analysis, and government contracting.

260 **Policy Formulation and Administration** (3)
Normative and analytical models of the policy process; effects of decision-making and institutional arrangements on public policy formulation and implementation.

262 **Seminar: Science, Technology and Public Policy** (3)
The impact of science and technology upon public administration in terms of both administrative practice and national policies.

295 **Research Methods** (3)
Theory and practice in research methodology. Data sources and gathering, research models and designs, analysis and testing, controls, interpretation and presentation of findings.

299 **Thesis Seminar** (3) (Campus Course)
Examination of thesis standards, research philosophy and methodology in public administration.

300 **Thesis Research** (3)

Religion

Chairman: R.G. Jones, Professor of Religion; O-102, Telephone 676-6325

9 **The Hebrew Scriptures** (3)
Historical and literary study of the Hebrew Scriptures (Old Testament) with consideration of development of religious ideas, institutions, and outstanding personalities.

10 **The New Testament** (3)
Study of New Testament literature from the standpoint of occasion, purpose, dominant ideas, and permanent values. Emphasis on approach, structure, and significance of the Gospels and Epistles.

21 **Religion and Man's Search for Meaning** (3)

Traditional religious concepts, language of contemporary religion amidst modern scientific and secular intellectual tendencies, and the place of religion in today's society.

22 **Religion and Contemporary Social Issues** (3)

Illumination of social problems by ethical reflection; examination of ethical perspectives as stimuli and barriers to social change; techniques for maintaining social values and seeking change.

59 **Religions of the East** (3)

Origins, evolution, and contemporary status in historical context of primitive religions, Hinduism, Buddhism, Taoism, Confucianism, and Shinto.

60 **Religions of the West and Near East** (3)

History of religion in the ancient world (*e.g.*, Greece) and of Judaism, Christianity, and Islam, including modern developments.

127 **Medicine, Religion, and Healing** (1) (Campus Course)

Total care concept. Importance of religion in medical practice for patient and physician. Concept of the professional, the clergy's role in healing, religious perspective on issues in medical ethics.

216 **Supervised Clinical Pastoral Education** (I-A) (6)

Full-time program of clinical pastoral education in an approved center. Involvement in the responsibility for pastoral ministry is reviewed and evaluated in a peer-group context.

217 **Supervised Clinical Pastoral Education** (I-B) (6)

A continuation of Rel 216 with emphasis on pastoral and personal identity, sustained pastoral relationships, and pastoral methods and skills.

218 **Supervised Clinical Pastoral Education** (III-A) (6)

Responsibility in pastoral ministry is increased with emphasis on group work, interprofessional involvement, use of specific counseling methods, work with persons with special problems. Prerequisite: Rel 216 and 217; or equivalent.

219 **Supervised Clinical Pastoral Education** (III-B) (6)

Continuation of Rel 218 with emphasis on examination and review of administrative procedures, design of pastoral programs, and development of pastoral theology.

222 **Seminar: Christian Ethics** (3) (Campus Course)

Important tendencies in ethical reflection of the contemporary Christian Church; contributions of social sciences to that reflection.

223 **Religious and Ethical Perspectives on Medical Problems** (3)

Religious and ethical questions in medical problems and medically related issues.

225 **The Dynamics of Ministering to the Young Adult** (3)

Conceptual models of development of young adults from late adolescence; special problems of educational and military experience, vocational choice,

marriage and the family, and physical, intellectual, emotional, and religi development. Encounter experience with persons and groups.

227–28 **Advanced Studies in Pastoral Care** (3–3)

History and present state of methodologies and conceptual models pastoral counseling and leadership in groups; supervised work in int faith and multidisciplinary ministries.

235 **Seminar: Roman Catholicism in the Modern World** (3) (Campus Course)

Important leaders and their ideas in selected developments since 1500- doctrinal, spiritual, biblical, liturgical, and ecumenical.

237 **Seminar: Theological Analysis** (3) (Campus Course)

Historical and topical study of the development of important ideas in suc areas as Christology, soteriology, and ecclesiology.

299–300 **Thesis Research** (3–3) (Campus Course)

Slavic Languages and Literatures

Chairman: G.A. Olkhovsky, Associate Professor of Russian; Library 627, Telephone 676-6335

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 **First-year Russian** (3–3) (Campus Course)

Beginners' course in fundamentals of grammar and pronunciation. Prerequisite to Slav 2: Slav 1. Laboratory fee, $17.50 per semester.

3–4 **Second-year Russian** (3–3) (Campus Course)

Intermediate course in Russian language. Prerequisite to Slav 3: Slav 1–2 or two years of high school Russian. Prerequisite to Slav 4: Slav 3. Laboratory fee, $17.50 per semester.

9–10 **Intermediate Russian Conversation and Composition** (3–3) (Campus Course)

Listening comprehension; oral and written practice. Prerequisite: Slav 4 or 6, or permission of instructor.

91–92 **Introduction to Russian Literature** (3–3)

Emergence and development of Russian literature and ideas during the 19th and early 20th centuries—in English.

109–10 **Advanced Russian Conversation and Composition** (3–3)

Developing proficiency in oral and written expression. Prerequisite: Slav 10 or equivalent.

161–62 **Russian Culture** (3–3)

Survey of Russian cultural heritage from origins of ancient Russia to present—in English. Lectures, discussion, reports.

165 **Soviet Literature from the Revolution to World War II** (3)

Basic themes, issues, literary figures of the Soviet 1920s. The fate of literature and writers under increasing state control; Five-year Plan literature. Lecture, discussion, reports—in English.

166 **Soviet Literature from World War II to the Present** (3)

Literature in wartime, under Stalinism, and in the "thaws." The new generation of dissident liberals and "underground" literature. Lecture, discussion, reports—in English.

ociology

hairman: T.F. Courtless, Jr., Professor of Sociology; D-201, Telephone 676-6345

Departmental prerequisite: Soc 1 is prerequisite to all other courses in Sociology mbered below 200 except for Soc 191.

1 **Introductory Sociology** (3)

General principles of sociology; development of culture and personality, impact of groups and institutions on social behavior.

2 **Major Social Issues** (3)

Critical examination of selected major social issues confronting American society. Topics change each semester. May be repeated once for credit. Prerequisite: Soc 1.

101 **Development of Social Thought** (3)

Examination of concepts and theories relevant to the nature of society and human relationships from ancient writings to the 20th century.

124 **Medical Sociology** (3)

Social factors and processes related to the etiology and treatment of physical and mental illness; medical occupations and professions, medical organizations, problems of delivery of health care services.

126 **Urban Sociology** (3)

Place of the city in larger society; growth of the city, problems of urban living, group life, personality, urban housing, city planning, and suburban development.

127 **Population Problems** (3)

Composition of populations, trends in population growth and population pressure, factors producing population movements, effects of migration, population policies—eugenics and birth control.

129 **Race and Minority Groups** (3)

Analysis of relationships between dominant and minority groups in society, particularly in the United States; nature and range of problems; analysis of the phenomenon of prejudice.

130 **Class, Status, and Power** (3)

Analysis of distribution of resources and opportunities for participation, education, and social mobility in American society; international comparisons; analysis of public policies which affect these distributions.

132 **Political Sociology** (3)

Analysis of problems involved in the study of power relations in society;

distribution of power in society; types and processes of government; po
ical participation and political mobilization.

135 Juvenile Delinquency (3)

Factors producing delinquency; juvenile detention, the juvenile cou
training schools, treatment of offenders.

136 Criminology (3)

Nature and distribution of crime as related to the development and ope
ation of criminal law and various social and legal institutions in urb
society.

137 Sociology of Law (3)

Law as a social phenomenon and agency of social control. Problems o
legal concepts, doctrines and institution.

139 Society and the Deviant (3)

Analysis of relationships of society, socialization, and deviancy. Social re
sponses to deviancy and criminal offenders; rehabilitative programs in
community, courts, and schools.

140–41 Social Research Methods (3–3)

Soc 140: introduction to basic research methods in sociology. Soc 141:
advanced research methods. Prerequisite to Soc 141: Soc 140.

143 Social Movements (3)

General survey of the various forms of collective behavior (fads, panics,
riots, social movements, etc.), and a more detailed study of the genesis,
development, and decay of social movements and social revolutions.

144 Public Opinion and Mass Communication (3)

Communication process with emphasis on international communications,
propaganda, and mass media; measurement of propaganda campaigns.

149 Modern Sociological Theory (3)

Systematic study of contemporary schools of sociological theory, both
European and American development; evaluation of scientific contribu-
tions of each school. Prerequisite: Soc 101.

153 Poverty in America (3)

Exploration of social and economic causes of poverty in the United States
and evaluation of anti-poverty strategies, including comprehensive welfare
reform. Discussion of conflicts between sociological and economic models
of behavior of low income groups.

155 Women, Sex Roles, and Socialization (3)

Analysis of the social-structural and personality theories and empirical
research on sex-role socialization in contemporary society. Topics in-
clude sexual inequality, women's changing place in the occupational
structure, and social change and the women's movement .

160 Death and Dying: A Sociological Perspective (3)

Processes of death and dying examined from cross-cultural and national
perspectives. Topics include considerations of terminal care, abortion,
murder, funeral customs, genocide, and the depiction of death in lit-
erature and philosophy.

191 Current Emphases in Sociology (3)

Analysis and evaluation of recent developments in the general field of sociology. Topic changes each semester; may be repeated for credit.

201 Concepts of Sociology (3)

Systematic survey, critical analysis of sociological concepts. Emphasis on theoretical systems. Topic changes each semester; may be repeated for credit. Admission by permission of instructor.

202 Uses of Sociology (3)

Examination of empirical research based upon theoretical perspectives introduced in Soc 201. An introduction to social research methods.

203 Social Organization (3)

Introduction to sociological concepts and perspectives on society as a system of institutions. Recommended for students offering sociology as a supporting field.

210 Theoretical Foundations of Political Sociology (3)

Sociological theory on the relationship of politics to the wider social system. Emphasis on concepts of power, alienation, ideology, political stability, conflict, and change.

211 Seminar: Social Change (3)

Comparative study of political processes concentrating on political development in Third World Nations.

228 Introduction to Urban Social Problems (3)

Analysis of urban social theories and paradigms used in urban analysis; historical development of urban centers, including growth, development and change in society's perceptions of problems; examinations of legislative changes and policy making as they apply to urban areas.

229 Analysis of Urban Social Problems (3)

Examination of specific urban social problems. Effects of density on populations, demographic changes in population, poverty in relation to urban problems, child abuse and family problems, prognosis for future of urban areas.

240 Sociology of Work and Occupations (3)

Analysis of occupational roles and structures; recruitment and training; adjustment problems at various career stages; interrelationships of stratification, life styles, and work roles.

241 Sociology of Work and Organizations (3)

Theory of complex organizations relative to work in industry, government, and business; examination of basic processes such as decision-making, recruitment, allocation of authority, informal organization, and interorganizational relations.

248 Seminar: Organizational Theory and Behavior (3)

Advanced analysis of theory and behavior in complex organizations relative to defining organizations, examining basic social processes and their relationship to the cultural environment.

252 **Seminar: Sociology and Social Policy** (3)

Concepts, theory and research which demonstrate the applicability of a ciological perspective (for example, views on social systems, roles, for organization, power, stratification, decision-making, social values) on policy process.

254 **Seminar: Methods in Social Policy Research** (3)

Systematic survey of conceptualization, design and practice of evalu tion research of social experiments, and of simulation and technologic forecasting. Prerequisite: Stat 105, Soc 230, 252; or permission of i structor.

*259 **Law and Criminology I: Search for the Causes of Criminal Beha ior** (3) (Same as Law 475[2])

*261 **Law and Criminology II: Society's Responses to the Criminal O fender** (3) (Same as Law 476[2])

262 **Seminar: Police and the Community** (3)

Analysis of contemporary urban law enforcement, including policin "styles," civil disorder, police-community relations, and competing per spectives on the place of police agencies in civil society.

263 **Seminar: Law and Society** (3)

Selected problems in law as instrument of social policy; emphasis on the organization of legal decision-making processes.

270 **Educational Sociology** (3)

Analysis of educational systems from institutional perspectives and as agencies of socialization; relationships of education in general to society, including technological, communal, and subcultural components.

271 **Sociology of the Youthful Offender** (3)

Factors producing delinquency, juvenile detention, the juvenile court, training schools, treatment of offenders.

273 **Deviant Behavior** (3)

Analysis of relationships of society, socialization, and deviancy. Social responses to deviancy and criminal offenders; rehabilitative programs in community, courts, and schools.

274 **Human Sexuality** (3)

A synthesis of theoretical perspectives from which analysis of various forms of sexual behavior and problems related to sexuality will be undertaken.

295 **Research** (arr.)

Independent study and special projects. Before permission is granted to register for Soc 295, the student must submit a written plan of study for the approval of the staff member of the department who will be directing the research. May be repeated once for credit.

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* Students registering for Soc 259 or 261 make special arrangements with the instructor for supplementary assignments equivalent to one additional semester hour. For description of the courses, see the *National Law Center Bulletin*.

351 Selected Topics in Sociology (3)

Intensive investigation of special topics in sociology. May be repeated for credit. The following topic(s) will be offered as the demand requires each fall semester: (1) *Social Research*—causal inference in social research, evaluation research, philosophy of science, etc.; (2) *Political Sociology*—comparative political structures, processes of policy formation, social movements, etc.; (3) *Sociology of Work*—work and public bureaucracies, industrial sociology, etc.

Spanish*

Chairman: G.E. Mazzeo, Professor of Romance Languages; Monroe 429, Telephone 676-6330

Placement Examination: A student who has not been granted advanced standing and who wishes to continue in college the language begun in high school must take a placement examination before registration. Upon completion of the examination, assignment is made to the appropriate course.

1–2 First-year Spanish (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Span 2. For beginners. Pronounciation, conversation, grammar, composition, readings. Oral practice in language laboratory. Laboratory fee, $17.50 a semester.

3–4 Second-year Spanish (3–3) (Campus Course)

A year course; credit toward a degree at this University given on completion of Span 4. Conversation, grammar review, composition, reading of modern Spanish prose. Oral practice in language laboratory. Prerequisite: Span 1–2. Laboratory fee, $17.50 a semester.

Special Education

Chairman: P. Botwin, Professor of Special Education; C-524, Telephone 676-6170

200 Psychosocial Development of Young Exceptional Children (3)

A course designed to illuminate the complex and interactive processes which exist in the relationship between psychosocial development and the developmental process in general.

201 Introduction to Special Education (3)

Survey course to acquaint prospective teachers with special education and to help them become aware of the various educational modifications necessary to accommodate children in a school program.

230 Vocational Assessment of the Secondary Level Handicapped Student (6)

Individual study of methods and materials used in vocational assessment including formal and informal tests to determine vocational in-

*Administered by the Department of Romance Languages and Literatures.

terests and aptitudes, academic performance, learning style and havioral readiness.

231 Selected Vocational Methods and Materials (3)

Selected materials and techniques used in teaching and programmi for the secondary school level handicapped person in academic, care leisure, and occupational skill areas.

232 Practicum: Vocational/Special Education (3)

Placement in at least three to five different sites offering programs the areas of pre-vocational, industrial arts, and vocational programmi that serve the adolescent student.

233 Curriculum for Vocational/Special Education (3)

Examples and practice in designing and implementing academic, sel help, career education, pre-vocational, industrial arts, and vocationa curriculum skills for the handicapped.

234 Seminar in Vocational/Special Education (3)

Weekly seminar dealing with experiences, problems, and concerns en countered during the internship with handicapped adolescents. Mus be taken concurrently with SpEd 295.

235 Coordination of Job Placement Programs in Vocational/Special Education (3)

Rationale and resources for programming considerations for the develop- ment and coordination of a successful job placement program for handi- capped adolescents.

236 Secondary Career Planning for the Handicapped in Vocational/Special Education (3)

(Formerly Postsecondary Career Planning for the Handicapped)

This course will address the on-going process of career decision-making and vocational preparation by the handicapped person who is completing a secondary school level program. Attention will also be devoted to past and present related legislation and its effect on vocational and special education programming.

260 Developmental Assessment of Young Exceptional Children (3)

Lectures, demonstrations, and clinical practice in formal and informal assessment procedures. Admission by permission of instructor.

261 Practicum: Methods and Materials for Young Exceptional Children (3-6)

Clinical practice in design and implementation of educational strategies and materials. Three dimensions: designing and developing teaching materials, classroom teaching, feedback and evaluation with professor. Taught at a demonstration site. Requires ten hours a week in-service on site.

262 Seminar: the Education of Young Exceptional Children (3)

Weekly seminar dealing with experiences, problems, and concerns encountered during the internship for the education of young exceptional children. Must be taken concurrently with SpEd 292. Admission by permission of instructor.

263 **Introduction to the Education of the Severely and Multiply Handicapped Child** (3)

Survey of the characteristics and learning patterns of children with severe disabilities. Lecture and discussion.

264 **The Severely and Profoundly Handicapped Child: Methods and Techniques** (3)

(Formerly Advanced Study in the Special Education of Severely and Multiply Handicapped Children)

Specialized programs, techniques, and methods for teaching children with severe disabilities. Lecture and discussion.

266 **The Development of Language in Young Exceptional Children** (3)

Introduction to the study of language acquisition and the application of current research on language of handicapped children.

267 **The Early Childhood Special Educator: A Survey of Roles and Services** (3)

Examination of the spectrum of roles available in early childhood special education; emphasis on role expectations and psychosocial dynamics of the various settings.

268 **The Development of Young Exceptional Children with Emphasis on Handicapping Conditions** (3)

An in-depth examination of young exceptional children and the specific nature of handicapping conditions. Lecture and field visitation required.

269 **Multi-Disciplinary Theory in Special Education** (3)

Weekly three hour seminar involving student presentations focusing on sociological and psychological constructs relevant to interpersonal/intrapersonal relationships.

270 **Adapting the Early Childhood Curriculum to the Young Exceptional Child** (3)

Review of the basic curriculum areas as they relate to the development of academic skills in young exceptional children. Lecture and discussion.

271 **The Interdisciplinary Approach to Planning for the Severely or Multiply Handicapped Child** (3)

Laboratory experience in which students participate as educational members of an interdisciplinary team.

273 **Seminar for Special Education Strategist Intern** (3)

Weekly seminar dealing with experiences, problems, and concerns encountered during special education/early childhood strategist internship. Concurrent enrollment in SpEd 293 required.

290 **Control and Management Techniques for the Young Exceptional Child** (3)

Examination of the theory, techniques, and tools essential for group control. Designed to provide practice as well as familiarity with the various theories of control and management of human behavior. Admission by permission of instructor.

292 **Professional Internship in Education of Young Exceptional Chi ren** (9)

Supervised internship in the education of young exceptional children. minimum of 420 clock hours required. Must be taken concurrently w SpEd 262.

295 **Professional Internship in Vocational/Special Education** (9)

Supervised internship in the vocational/special education of adolesce handicapped youth, emphasizing the diversified, multi-dimensional, a inter-agency cooperative needs for such programming. A minimum 420 clock hours is required. Must be taken concurrently with SpEd 23

303 **Administration and Supervision of Special Education** (3)

Philosophy and nature of special education; litigation, program organiza tion, administration, and development. Surveying local-level needs; pro gram evaluation and supervision. Admission by permission of instructo

306 **Dynamics of Family Intervention: Theory and Practice in Special Education** (3)

Theoretical foundations and clinical techniques necessary for the earl childhood special educator to successfully counsel parents of handi capped children.

360 **Advanced Techniques in the Diagnostic-Assessment Process** (3)

To broaden the diagnostic expertise of the participants in: the applicatio of theoretical concepts of assessment; the development of assessment pro grams; and the interpretation and application of interdisciplinary diagnos tic evaluations. Prerequisite: SpEd 260 or equivalent.

Speech and Drama

Chairman: L.S. Bowling, Professor of Speech and Hearing, Auditorium 6, Telephone 676-6350

1 **Communicative Speaking and Listening** (3)

Basic theories and principles of speech communication; composition, delivery, and criticism of speaking in interpersonal, group, and public situations. Recording fee, $4.

11 **Voice and Diction** (3)

Development of naturalness, correctness, and clarity in conversational speech. Analysis and correction of individual speech delivery faults through tapes and weekly performances. Recording fee, $4.

32 **Interpretation of Literature** (3)
(Formerly Oral Interpretation of Literature)

The study of literature through performance. Interpretation of prose, poetry, and drama. Recording fee, $4.

45 **Understanding the Theater** (3)

The art of the theater; its literature, aesthetics, and mechanics. Contributions of the playwright, actor, director, and designer examined through

lectures and class discussions. Attendance at theatrical performances and presentations by visiting artists.

*111 **Business and Professional Speaking** (3)

Study of the communication process in business and professional speaking; practice in presenting technical reports; selling policies, programs, and services; interviews; conferences; speech in training and supervisory activities. Primarily for nonmajors.

121 **Group Discussion and Conference Leadership** (3)

Process of thinking and problem-solving in committees and small groups; methods of leading discussions and conferences. Prerequisite: SPDR 1 or permission of instructor.

Statistics

Chairman: S.W. Greenhouse, Professor of Statistics; C-311, Telephone 676-6356

Departmental prerequisite: One entrance unit in algebra is prerequisite to courses in Statistics numbered below 100.

††‡51 **Introduction to Business and Economic Statistics** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, tests of hypotheses, regression and correlation, time series, index numbers. Laboratory fee, $18.

‡54 **Introduction to Statistics in Social Science** (3)

Lecture (3 hours), laboratory (1 hour). Frequency distributions, descriptive measures, probability, sampling, estimation, test of hypotheses, regression and correlation. Laboratory fee, $18.

‡101–2 **Basic Principles of Statistical Methods** (3–3)

Variables and attributes, averages and dispersion, elementary principles of sampling, introduction to the making of statistical decisions. Prerequisite to Stat 102: Stat 101.

105 **Statistics in the Behavioral Sciences** (3) (Campus Course)

Lecture (3 hours), laboratory (1 hour). Advanced study of statistical techniques for research problems. Analysis of variance, correlation techniques, nonparametric techniques, sampling theory. Prerequisite: Stat 53 or 54, or equivalent and satisfactory performance on a placement examination. Laboratory fee, $18.

111 **Business and Economic Statistics I** (3) (Campus Course)

Statistical methods appropriate for applications in economics and business.

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*This course can be adapted to the needs of a specific group.

†Stat 101, which is offered off campus, may be substituted.

‡Stat 51, 54, and 101 are related in their subject matter, and credit hours for only one of the three may be applied toward a degree.

112 Business and Economic Statistics II (3) (Campus Course)

Continuation of Stat 111 with emphasis on techniques of regression, C square, sampling designs, index numbers, and other topics used in econo ics and business.

127 Statistics for the Biological Sciences (3)

Introduction to statistical techniques and reasoning applicable to the b medical and related sciences. Properties of basic probability functio binomial, Poisson, and normal. Data analysis, inference, and expe mental design.

211 Introduction to Economic Statistics (3)

A survey of statistical techniques for application to problems in econom analysis. (For special studies students only.)

Telecommunication Operations

Faculty Advisor: D.A. Rowley, Associate Professor of Chemistry; Bacon 201, Tele phone 676-6210

240 Seminar in Telecommunication Policy and Regulations (3)

International and domestic telecommunications institutions; the policy and regulatory process; spectrum management; cable telecommunications systems; common carrier/microwave transmissions system; mobile systems broadcasting-AM, FM, UHF, VHF-TV; satellites; United States domestic satellites; mobile satellite system; international telecommunications law; environmental impact; United States government systems; INTELSAT.

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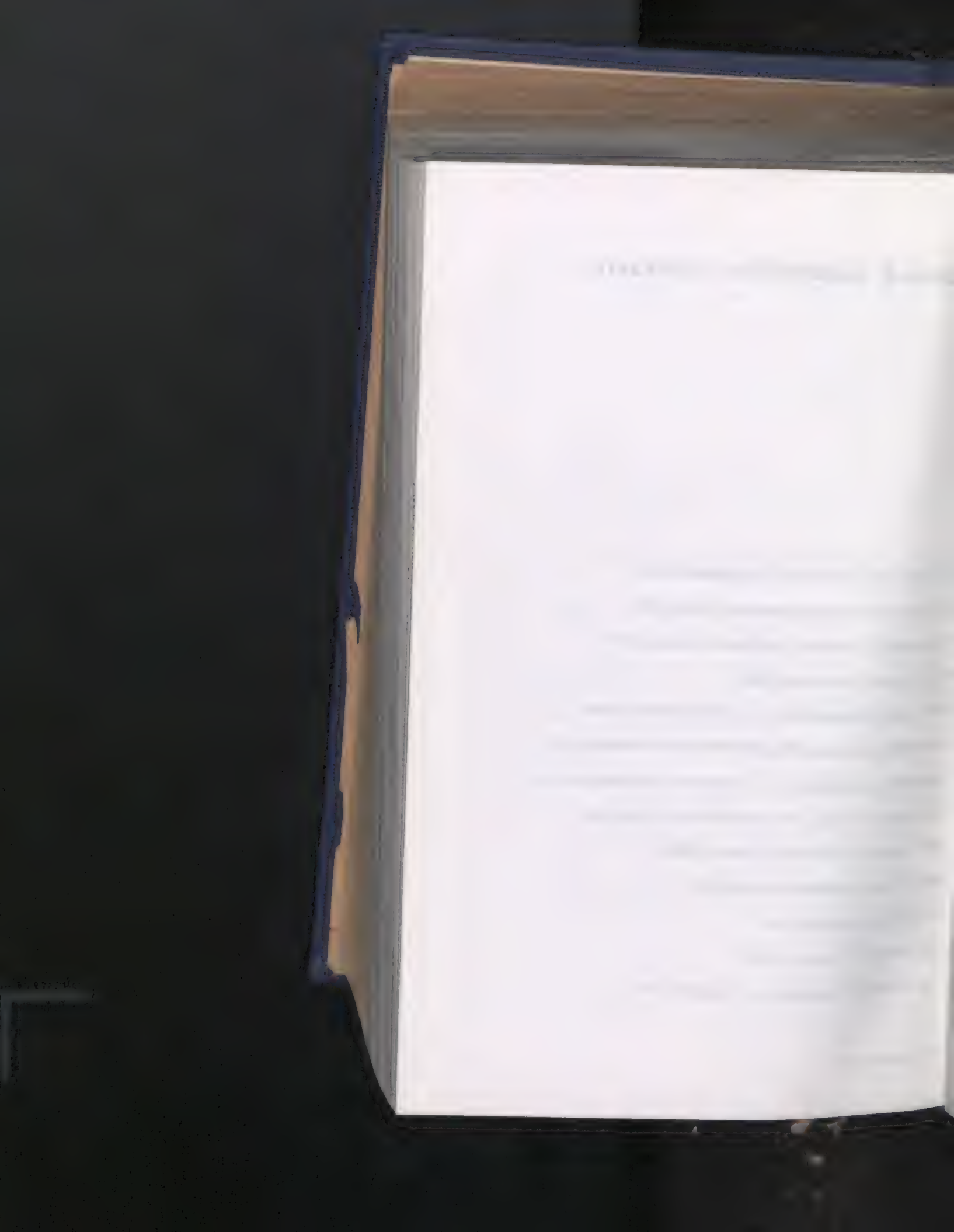
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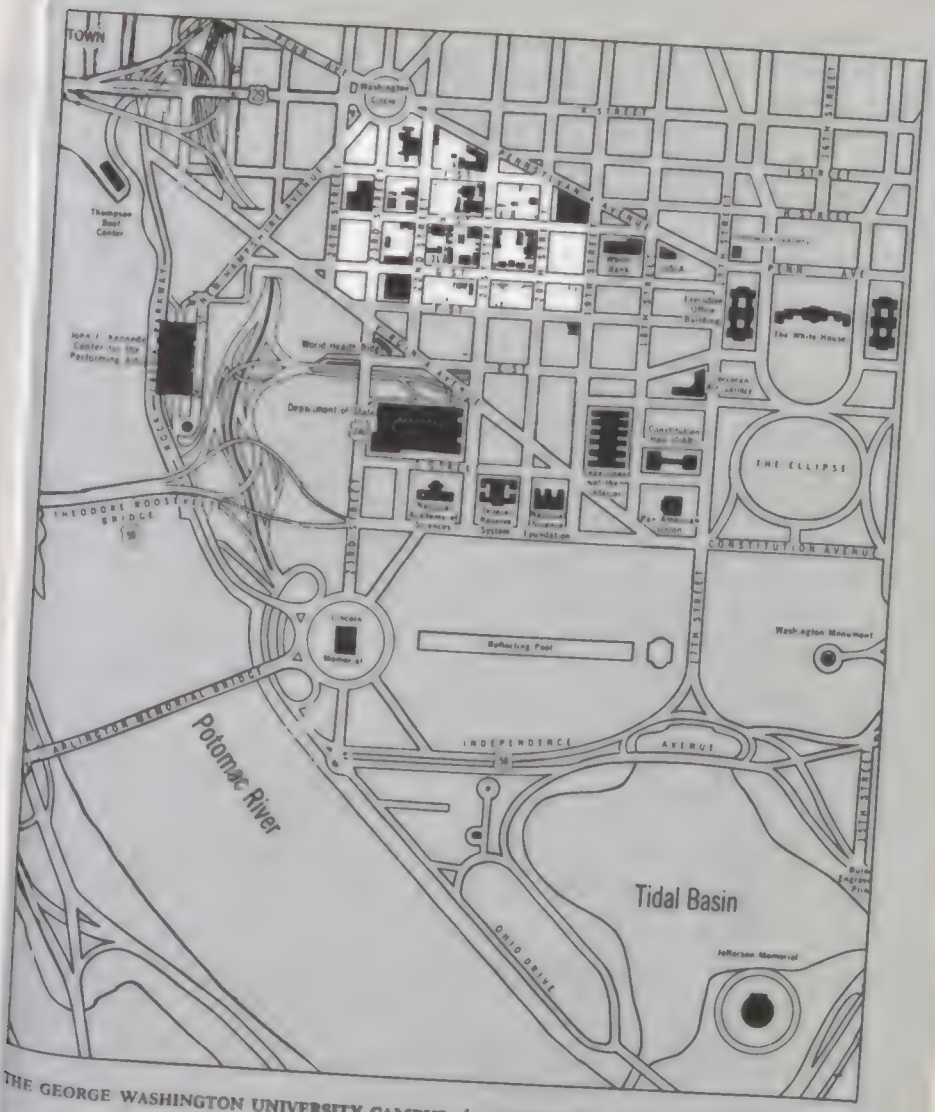
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